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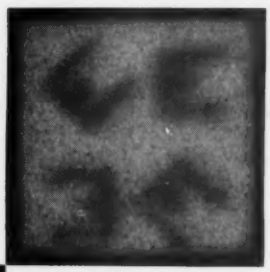
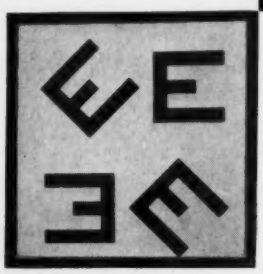
The accompanying photographs show just one of the reasons why those lenses are harmful to the delicate eye mechanism. The illustration (*right*) shows how a blown coquille lens distorts and diffuses a projected image, while the photograph (*below*) shows how sharp and clear the same image appears through a ground and polished lens. In addition, the light transmission of these lenses is usually highly selective and thus habit-forming. The disturbance of lenses such as these in front of emmetropic eyes can be bad enough, but consider how seriously they might affect a prescribed correction when worn in front of glasses.





These photos were made by placing an ordinary blown coquille lens (above) and a ground and polished lens (left) in front of a Ferree Rand Acuity projector. Try this test. See it for yourself.

Twenty million people can't be wrong. They feel the need for glare protection but it was not provided for them by refractionists.

To this problem which is annually becoming greater, we believe that there is but one logical solution: Refractionists must consider the patients' need for glare protection and prescribe it for them either in a regular correction or with auxiliary lenses. For those patients who are at all hypersensitive to light, we recommend the correction being ground into a Soft-Lite lens in one of the four available shades.

We believe Soft-Lites to be the most efficient glare absorptive lenses made because they give neutral light transmission without affecting the color spectrum. Manufactured by Bausch & Lomb, their quality is unexcelled—and they are available in a complete single vision as well as bifocal lens line.

For auxiliary glare protection lenses, we suggest your recommendation of Slip-Over specs or goggles with *ground* and *polished* lenses. They are safe for the eyes.

As a manifestation of our good faith in this matter, we have withdrawn all coquille and micoquille lenses from our line and effective as of March 1st, 1936, we are selling only those goggles, sun glasses or Slip-Overs that are glazed with ground and polished lenses.

**Figure based upon surveys made by the Better Vision Institute*

The Advertisement is Published in the Interest of Eyesight Conservation by

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 19 MARCH, 1936 NUMBER 3

IDIOPATHIC FLAT DETACHMENT OF THE MACULA

FRANK B. WALSH, M.D. AND LOUISE L. SLOAN, PH.D.

BALTIMORE

The clinical characteristics of a macular affection are described and three case studies are presented. The symptoms are sudden moderate diminution of visual acuity, a positive scotoma, metamorphopsia, and micropsia. When the fovea is involved, a hyperopia appears. Usually only one eye is affected. After several months the positive scotoma and metamorphopsia disappear and the vision becomes normal. Slight micropsia persists. The diagnosis of flat detachment of the macula is suggested by the symptoms and confirmed by examination with a binocular ophthalmoscope. There is a tendency to remissions of milder intensity than the original attack. From the Wilmer Ophthalmological Institute, Johns Hopkins University.

The purpose of this paper is to report three cases of a peculiar macular affection which we have observed during the past year and which represent a definite clinical entity.

The essential subjective symptoms of this condition are unilateral dimness of vision with a positive scotoma, metamorphopsia, and micropsia. Examination of the eyes with a hand ophthalmoscope shows an ill-defined macular change suggesting an early choroiditis. Examination with the binocular ophthalmoscope, however, shows a definite swelling in the macular region of 3 to 4 disc diameters in area, with a few small yellowish spots in the retina. Otherwise ophthalmoscopic examination is negative. There is an acquired transient hyperopia. Perimetric examination shows a central scotoma that may be absolute for small colored test objects. The disease tends to be self-limited and within a few weeks the macular protrusion commences to flatten. The yellowish spots, however, are increased in number at this time. In from two to four months the macular protrusion and the acquired hyperopia disappear and the central scotoma disappears or is greatly reduced. The yellowish spots disappear. Micropsia and change in the light sense persist. There is a marked tendency to relapses which are of lessened severity.

Case 1

On September 8, 1935, J.H.B., a white male school teacher, aged 40 years, sought advice because of a dark spot before his right eye.

The family history was irrelevant. At 18 years of age he had had acute suppurative appendicitis. Otherwise he had always enjoyed excellent health. He smoked 18 to 20 cigarettes daily and used alcohol in moderation.

About the middle of August, 1934, he noticed, while playing golf, that the ball appeared to be yellowish and elliptical. The ground on which it rested had an irregular appearance. While looking through a microscope he saw a dark, yellowish, circular spot constantly in front of the right eye. Objects seemed smaller with the right eye than with the left. Lines appeared wavy and double vision was noted occasionally. There was no complaint of pain. The symptoms did not change.

On September 8th, external examination of the eyes was negative. R.E.V. (no gl.) = 20/30 —2, J-2 at 12″ slowly. L.E.V. (no gl.) = 20/15, J-1 at 12″ readily. Ophthalmoscopic examination of the right eye with pupil dilated showed clear media. The macula was slightly blurred and many superficially situated small, yellowish-white spots were noted in that region. The fundus was otherwise normal. Examination

with the Gullstrand ophthalmoscope revealed a dome-shaped swelling centered on the fovea of about four times the size of the optic disc. The margins of the affected area were clearly defined. The foveal pit did not appear to be so deep as would be expected with edema of the macula. The vessels in the affected region looked normal. Ophthalmoscopic examination of the left eye was negative. Slitlamp examination of both eyes was negative. Examination of visual fields showed a central scotoma in the right eye.

A diagnosis of central choroiditis was made and the patient was admitted to the Wilmer Institute for study. General examination showed that he had infected tonsils and abscessed teeth. These foci were eradicated on September 11th. The usual laboratory tests were negative.

On September 22d, R.E.V. (no gl.) = 20/40+3. The appearance of the fundus was unchanged. On October 20th, the macula appeared to be slightly less elevated when viewed with the Gullstrand ophthalmoscope. There was an increase in the number of yellowish spots. Examination with the Friedenwald ophthalmoscope showed, by reduplication of the beam, that there was an appreciable distance between the anterior surface of the retina and the choroid. The space was optically clear. This is illustrated in figure 2 where the appearance of reduplication of the beam is intentionally exaggerated.

On November 20th, the elevation had diminished somewhat. On January 30, 1935, R.E.V. (no gl.) = 20/15. The macula appeared normal except for a few remaining yellowish spots.

Subjective tests are summarized below. The left eye remained normal throughout the period of investigation. Manifest refractions were done except as otherwise stated.

Refraction

Right Eye:

September 22, 1934.	+2.00 D.sph. ⊂ +0.25 D. cyl. ax. 90° = 20/20—2. (Retin. Homat. +1.50 D.sph.)
September 29, 1934.	+1.75 D.sph. ⊂ +0.25 D. cyl. ax. 90° = 20/20+1.
October 13, 1934.	+1.75 D.sph. ⊂ +0.25 D. cyl. ax. 90° = 20/20+3.
November 7, 1934.	+1.00 D.sph. ⊂ +0.25 D. cyl. ax. 90° = 20/30. (Retin. Homat. +1.00 D.sph. ⊂ +0.25 D. cyl. ax. 90°.)
December 18, 1934.	+0.50 D.sph. = 20/15—3.
February 5, 1935.	+0.50 D.sph. = 20/15—2.
May 8, 1935.	+0.50 D.sph. = 20/15. (Retin. Homat. +0.75 D.sph. ⊂ +0.50 D. cyl. ax. 105°.)

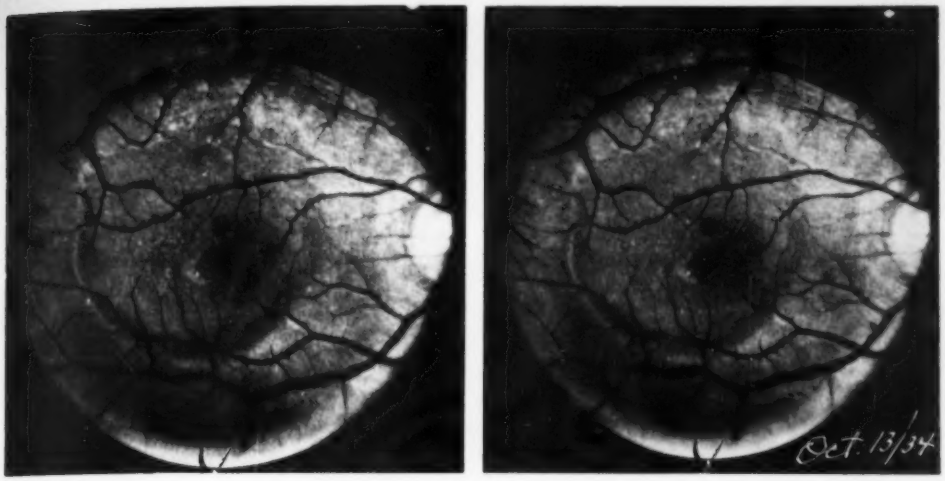
Left Eye:

+0.50 D.sph. = 20/15. (Retin. Homat. + 0.50 D. sph.)
No change during period of investigation.

Perimetric examination

Peripheral fields: Normal O.U. throughout period of investigation
Blind spots: Normal O.U. throughout period of investigation.
Central scotoma: (See figure 3.)

September 22, 1934.	½° blue and ½° red—absolute scotoma. 1° blue—absolute scotoma surrounded by relative scotoma (test object appears green). 1° red and ½° white—relative scotoma (test object appears dim).
September 29, 1934.	½° blue—absolute scotoma. 1° blue, ½° red, ½° white—relative scotoma (test object dim). Improvement—scotomas for 1° blue and ½° red, which were absolute, are now relative.
October 13, 1934.	½° blue—absolute scotoma, smaller than before, surrounded by relative scotoma (test object dim). 1° blue, 1° red, ½° white—relative scotoma (test object dim). Further improvement.
December 18, 1934.	½° blue, ½° red, 1° blue, 1° red, ½° white—"micropsia scotoma" (definitely limited area in which test object appears smaller). Further improvement.
February 5, 1935.	All test objects show a "micropsia scotoma" similar to that found in previous test, but less extensive. Further improvement.
May 8, 1935.	No central scotoma demonstrable.



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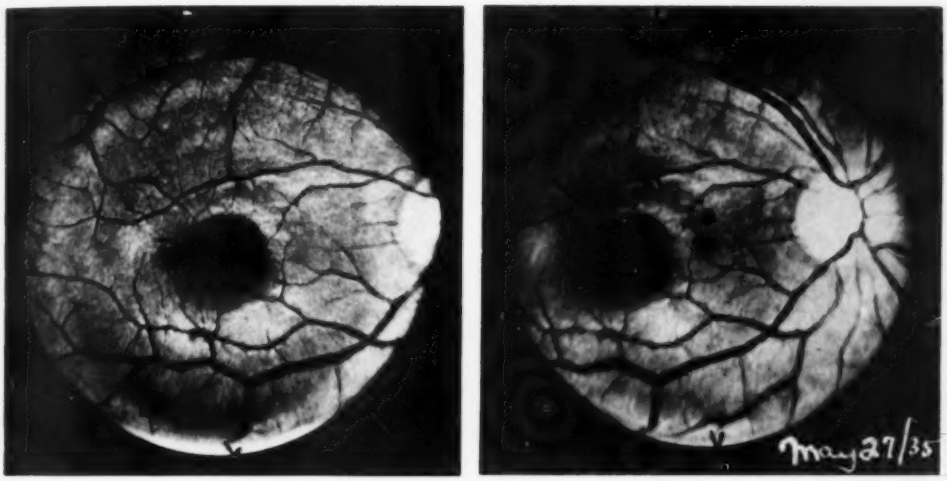

B

Fig. 1 (Walsh and Sloan). Photographs of fundus, case 1. A, stage of detachment; B, stage of recovery.

Fig. 2 (Walsh and Sloan). Showing reduplication of beam with Friedenwald ophthalmoscope, case 1.

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Positive scotoma

September 22, to December 18, 1934.	In moderate illumination patient sees dark shadow in front of right eye. In darkness the positive scotoma appears as a bright spot.
February 5, 1935.	No positive scotoma.
May 8, 1935.	No positive scotoma.

Metamorphopsia

September 22, 1934.	Horizontal and vertical lines show marked distortion over wide area. Patient unable to give accurate description.
November 7, 1934.	Patient believes distortion is more marked than before.
February 5, 1935.	Horizontal lines show slight bowing in toward fixation point. Vertical lines appear almost normal. Distortion less than in November.

Micropsia

December 18, 1934.	Snellen letters at 20 ft. appear about 18 percent smaller to R.E. (Iseikonic lenses used to measure size difference.) Larger object (subtending angle of 4 degrees) appears about 5 percent smaller to R.E.
May 8, 1935.	Size difference of about 5 percent for both large and small objects (4 degrees and 5 min.). Patient states that when playing golf he has difficulty in judging distances.

Measurements of light minimum* (see figure 4)

May 8, 1935.	Light minimum increased (sensitivity reduced) in area extending from about 15 degrees in nasal field to about 5 degrees in temporal field. Greatest reduction in sensitivity in nasal field, 5-10 degrees from fixation point. In this region light minimum of R.E. four times that of the left.

*A detailed description of the apparatus and the method used in making such determinations, and the results in other pathological conditions will be given by one of us (L.I.S.) in a later publication.

Case 2

C.H., a white man, aged 35 years, an insurance salesman, sought advice on December 18, 1934, regarding a sudden reduction of visual acuity in his right eye.

The family history was negative.

In 1927, he had been a patient in the Johns Hopkins Hospital for six months following an automobile accident in which his skull was fractured. Diplopia was present for eight weeks. A weakness of the right superior-rectus muscle persisted. During the last six weeks of this period of hospitalization he had been transferred to the psychiatric ward because of nervousness and apprenhension. In 1930, he had had acute appendicitis for which an operation had been performed. In 1933, he had had scarlet fever and in the same year an acute arthritis of the right shoulder. Several infected teeth had been extracted a few days before he sought advice regarding his eye. He smoked 15 to 20 cigarettes daily and used alcohol in moderation.

About December 10, 1934, the vision of the right eye became blurred and objects seen with that eye appeared to be distorted and smaller than those seen with the left eye. There was a feeling of discomfort in the eye.

On December 18th, external examination was negative except that diplopia was elicited in the field of primary action of the right superior-rectus muscle. R.E.V. (no gl.) = 20/40, L.E.V. (no gl.) = 20/10 —1. Ophthalmoscopic examination of the right eye showed a questionable edema of the macula and several yellowish spots scattered over the macula and adjoining retina. Further examination with the Gullstrand ophthalmoscope revealed an elevated area similar in appearance to that described in case 1. The Friedenwald ophthalmoscope was used and, with difficulty, reduplication of the beam was observed. Slitlamp examination of both eyes was essentially negative. Examination of the visual fields showed a central scotoma in the right eye.

General examination was negative.

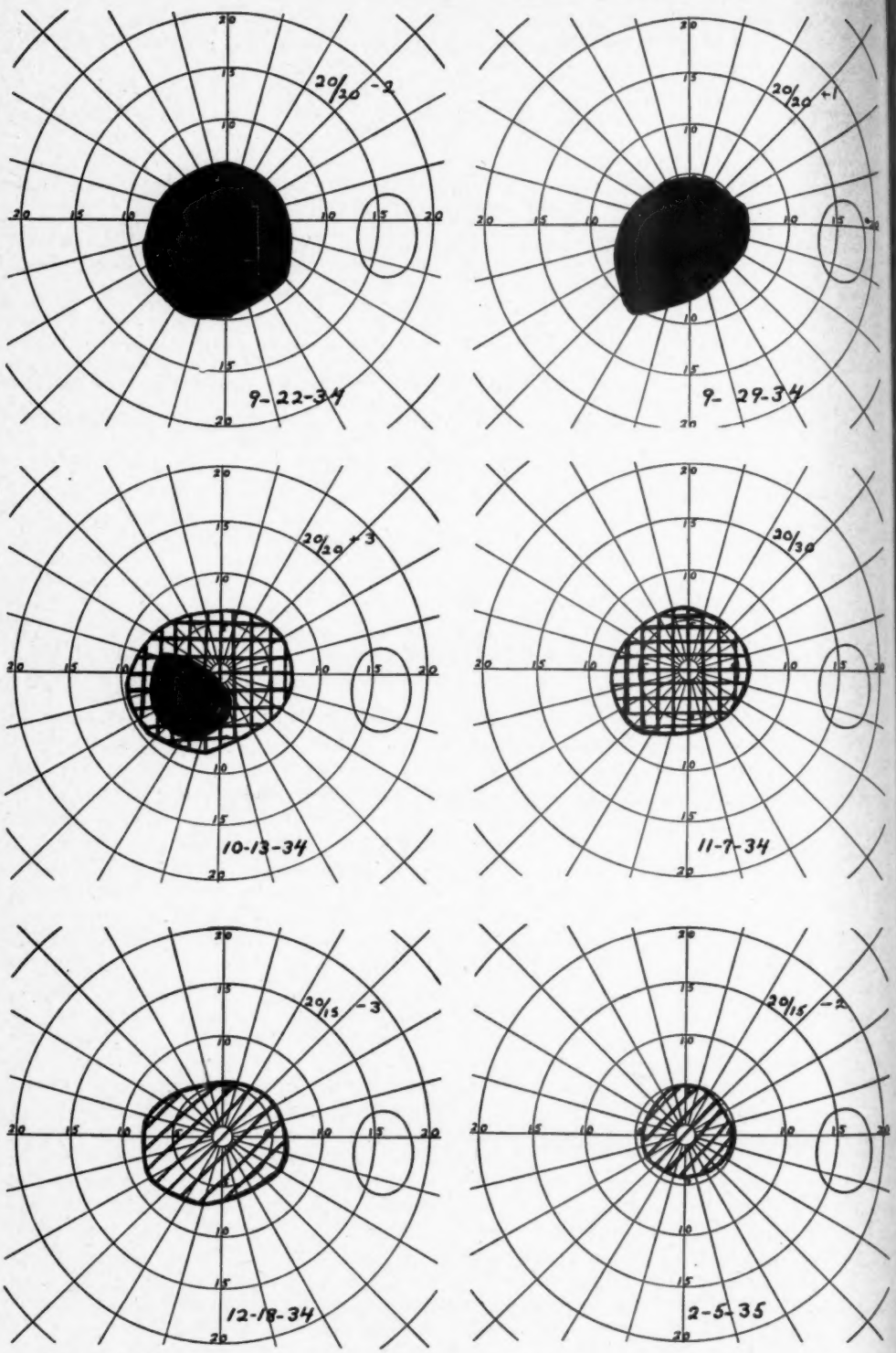
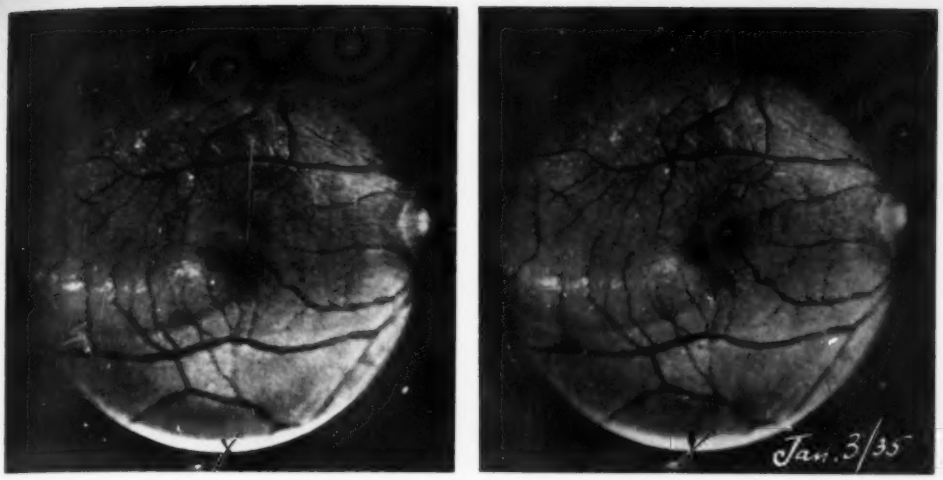


Fig. 3 (Walsh and Sloan). Central scotoma for ½° blue, case 1. Absolute scotoma shown in solid black; relative scotoma, double cross-hatched; "micropsia scotoma," single cross-hatched.



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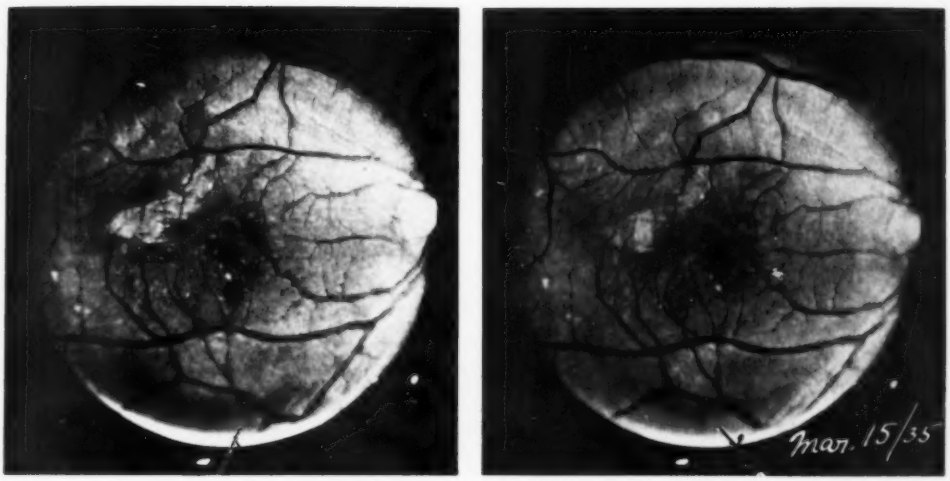

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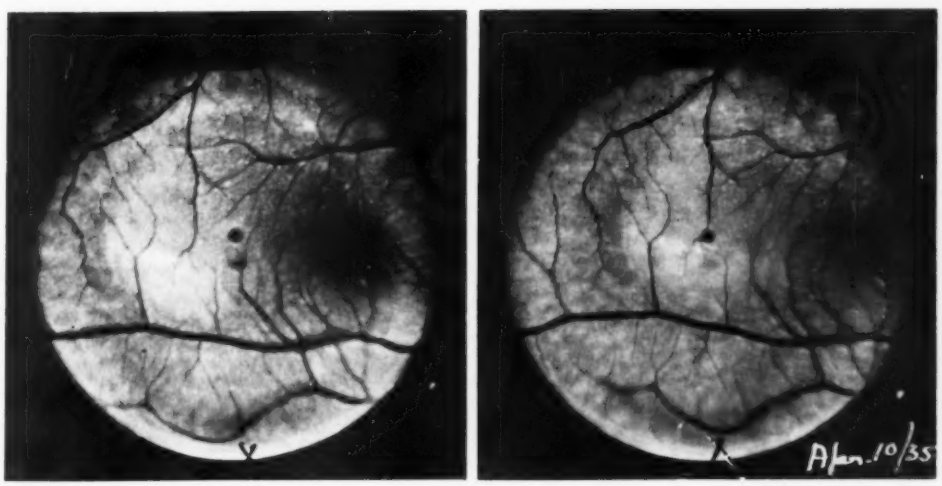

C

Fig. 5 (Walsh and Sloan). Photographs of fundus, case 2. A, stage of detachment; B, recovery; C, relapse.

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He declined a thorough examination of the genito-urinary tract. The usual laboratory tests were negative and no treatment was advised.

On January 3, 1935, there appeared to be a slight lessening of the protrusion seen with the Gullstrand ophthalmoscope. R.E.V. (no gl.) = 20/70.

On January 30th, R.E.V. (no gl.) = 20/30. Findings with the Gullstrand instrument were unchanged except that many more spots were present.

On March 15th, R.E.V. (no gl.) = 20/15+2. The macula appeared to be flat. The spots were less numerous but in places had coalesced. He continued to complain of micropsia. The positive scotoma was faintly visible and on the tangent screen was decreased in density.

On May 12th, the patient said that on about April 15th, he had noticed a change in the positive scotoma. It appeared to be denser than before, but had become paracentral and consequently did not affect central vision. He had independently sought advice from a urologist who pronounced the prostate infected and instituted a course of prostatic massage.

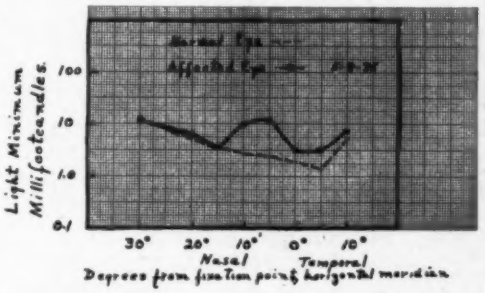


Fig. 4 (Walsh and Sloan). Light sense, case 1.

R.E.V. (no gl.) = 20/15+2. Examination with the binocular ophthalmoscope revealed an area of elevated retina situated farther temporally than before (fig. 5 C). He is to return for further observation.

Refraction

Right Eye:

December 28, 1934.	+1.00 D.sph. = 20/30.
January 10, 1935.	+1.00 D.sph. = 20/15—2. (Retin. Homat. +0.50 D.sph.)
January 18, 1935.	+0.75 D.sph. = 20/15—1.
January 30, 1935.	+1.00 D.sph. = 20/15—2.
March 6, 1935.	+0.25 D.sph. = 20/15—2.
March 22, 1935.	+0.25 D.sph. = 20/15.
May 13, 1935.	+0.25 D.sph. = 20/10—1. (Retin. Homat. +0.50 D.sph.)

Left Eye:

No glass accepted = 20/10—1. No change during period of investigation.

Perimetric examination

Peripheral fields: Normal throughout period of investigation
Blind spot: Normal throughout period of investigation.
Central scotoma (see figure 6):

December 28, 1934.	1° blue, 1° red, ½° white: absolute scotoma (scotoma for ½° white does not involve fovea). 1° white: relative scotoma (test object appears dim).
January 3, 1935.	1° blue: absolute parafoveal scotoma, relative central scotoma (test object appears green). 1° red: absolute parafoveal scotoma surrounded by relative scotoma involving foveal area (test object appears dim). ½° white: "micropsia scotoma" involving fovea (test object seen as pinpoint of light). Marked improvement.
January 10, 1935.	1° blue: relative scotoma (test object green and small). ½° blue: similar scotoma of greater extent. 1° red: "micropsia scotoma" (test object small). ½° red: similar scotoma of greater extent. ½° white: relative scotoma (test object dim and small). Definite improvement.
January 18, 1935.	1° blue, 1° and ½° red, ½° white: scotomas similar to those found in previous test. ½° blue: absolute parafoveal scotoma, relative central scotoma (test object appears green). Slightly worse?

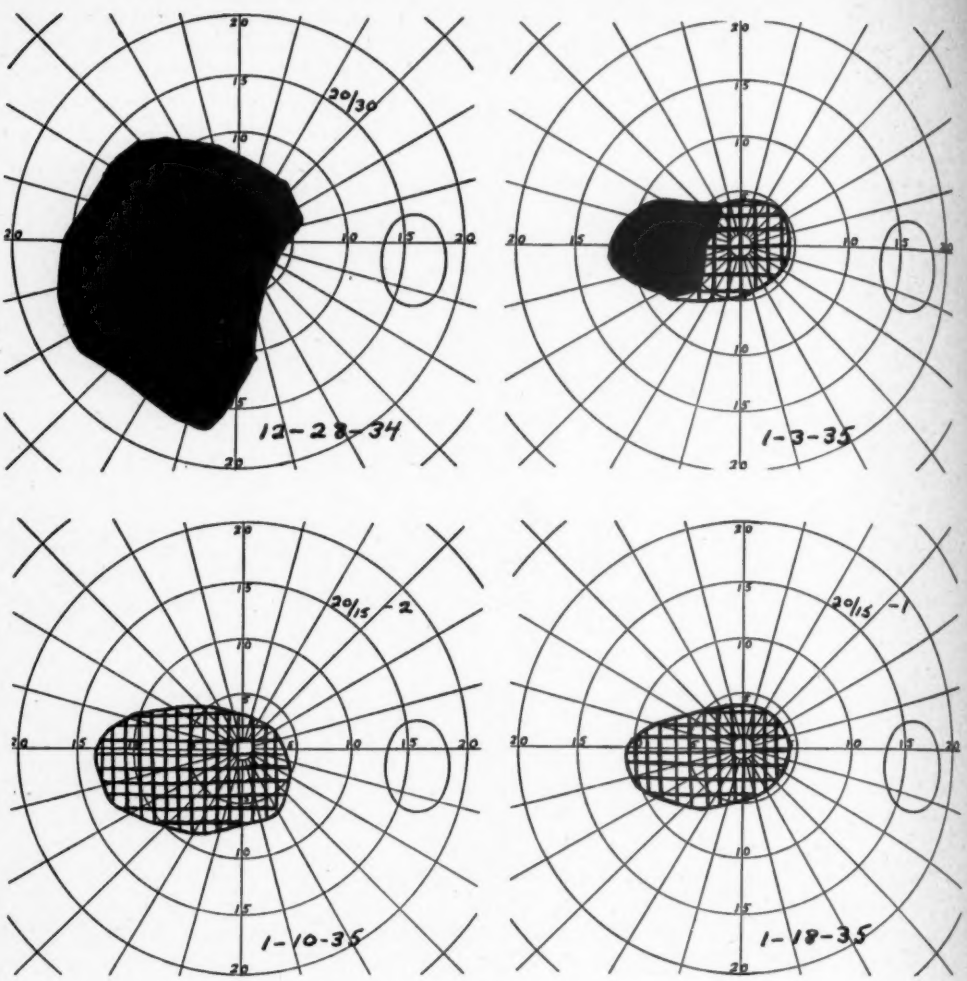


Fig. 6

January 30, 1935.	1° blue and red: small absolute parafoveal scotoma surrounded by relative scotoma involving foveal area (1° blue appears green, 1° red is dim). ½° white; "micropsia scotoma" of greater extent than in previous test (test object of pinpoint size). Slightly worse.
March 6, 1935.	1° blue, 1° red, ½° white: As in previous test but scotomas less extensive. Improvement.
March 22, 1935.	1° blue: relative scotoma (test object appears small and is greenish in small area at fixation point). 1° red and ½° white: relative scotoma (test object dim and small). No significant change.
May 13, 1935.	1° blue and ½° blue: absolute paracentral scotoma surrounded by relative paracentral scotoma (test object greenish and small). ½° red: paracentral scotoma, absolute, surrounded by relative zone (test object dim). 1° red: relative paracentral scotoma (test object dim). ½° white: "micropsia scotoma" (seen as point of light with very irregular outlines). The scotoma is now entirely paracentral without any involvement of the foveal region, but in the paracentral region is denser than before.

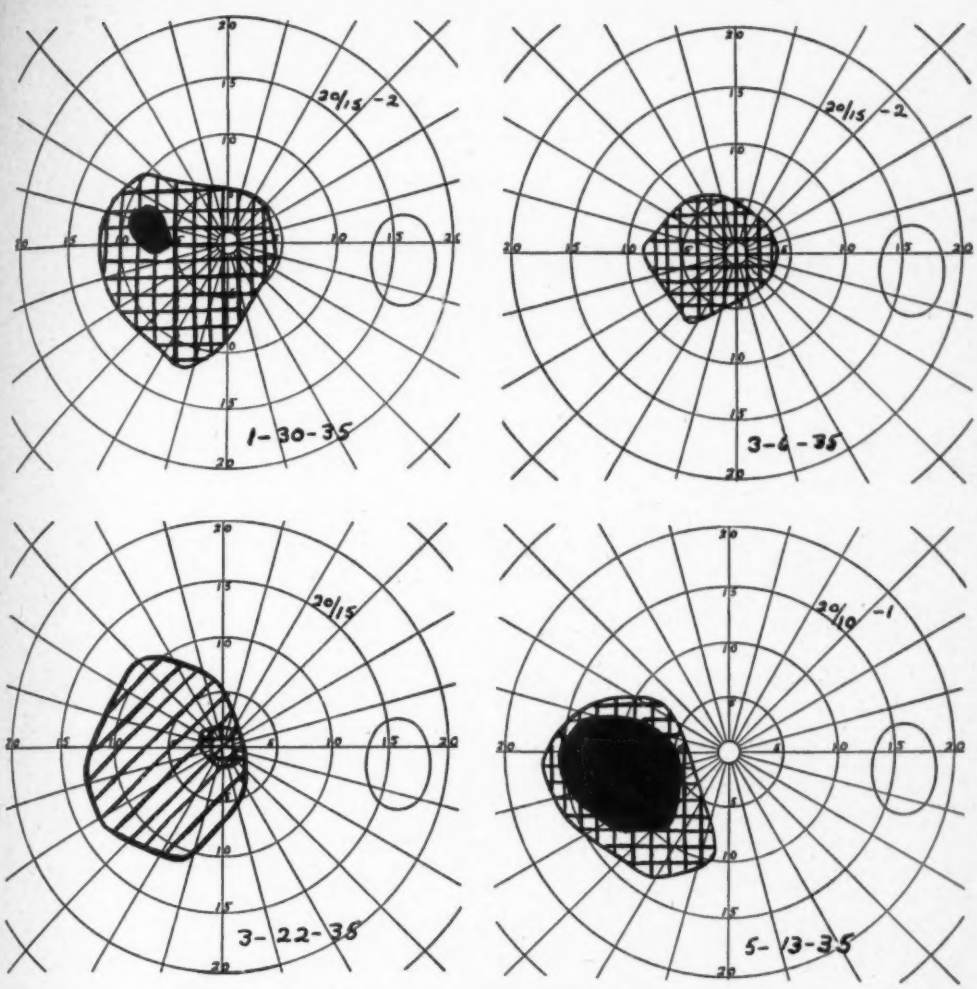


Fig. 6 (cont.) (Walsh and Sloan). Central scotoma for 1° blue, case 2. Absolute scotoma shown in solid black; relative scotoma, double cross-hatched; "micropsia scotoma," single cross-hatched.

Positive scotoma

January 18, 1935.	In moderate illumination patient sees a dark shadow in front of R.E. In darkness sees a bright spot.
March 22, 1935.	Dark shadow seen in moderate illumination as before. Bright spot no longer seen in dark room.
May 13, 1935.	Patient notices a change in shape and location of dark shadow.

In this case the shadow was sufficiently definite to enable the patient to trace its outlines on a tangent screen. Figure 7 shows drawings of the scotoma seen on a light-gray screen in the Ferree-Rand perimeter.

Metamorphopsia

January 3, 1935.	Marked distortion. Vertical and horizontal lines convex toward fixation point. Circle seen as an ellipse with long axis approximately vertical.
March 6, 1935.	Distortion definitely less on temporal side of fixation point.
May 13, 1935.	No distortion noticed.

Micropsia

January 3, 1935	Snellen letters at 20 ft. appear about 18 percent smaller to R.E. (Iseikonic lenses used to measure difference in size.) Patient states that defective vision in R.E. does not interfere with bowling. Believes that he suppresses right eye image.
March 22, 1935.	Micropsia still present. No quantitative tests made. Objects look farther away with R.E. In bowling is now troubled by double vision.
May 13, 1935.	Micropsia still present. Patient states it is less in amount but bothers him more. Judgment of depth unreliable. In bowling, ball looks as if it will strike pin, but misses it by a wide margin.

Light minimum (see figure 8)

March 6, 1935.	Light minimum markedly increased (light sensitivity reduced) in area extending from about 20° in nasal field to about 5° in temporal field. Greatest reduction in sensitivity at fixation point where R.E. requires more than 1000 times as much light as L.E.
May 13, 1935.	Definite improvement at fixation point where R.E. now requires 5 times as much light as left. Region of greatest increase in light minimum is now in nasal field 10° from fixation point.

Case 3

J.F., a white man, aged 35, a garage mechanic, was first examined on January 8, 1935. He complained of blurring of vision of his left eye.

The family history was negative. He had always been healthy, but considered himself highly nervous. He did not use alcohol nor tobacco.

Late in December, 1934, he complained of marked blurring of vision of his left eye. He noted a centrally situated shadow and, coincident with the blurring, a slight distortion and diminution in the size of objects seen with the affected eye. There was no complaint of pain.

On January 8, 1935, the eyes were normal externally. He had worn glasses for years and with them the R.E.V. w —0.25 D. sph. ⌯ —0.75 D. cyl. ax. 180° = 20/20. L.E.V. w —0.25 D. cyl. ax. 180° = 20/50.

Ophthalmoscopic examination of the right eye showed it to be normal, and it remained so throughout the period of investigation. The macular region of the left eye showed an ill-defined change, consisting of a questionable edema and the appearance of slightly increased pigmentation. The Gullstrand ophthalmoscope revealed a picture similar to that observed in cases 1 and 2. Only a very few spots were seen. Reduplication of the beam with the Friedenwald ophthalmoscope was not obtained. Slitlamp examination of both eyes was negative. A central scotoma was found in the visual field of the left eye.

General examination resulted in locating an abscessed tooth, which was extracted. The usual laboratory tests were negative.

On January 14, 1935, L.E.V. (no gl.) = 20/100. There was a marked increase in the number of superficial spots in the retina.

On January 30, 1935, definite improvement was noted with the Gullstrand instrument.

On May 2, 1935, the macula appeared to be flat. Pigment changes persisted. There was a marked decrease in the number of spots in the retina.

Refraction

Left Eye:

January 14, 1935.	+0.62 D.sph. = 20/50+4. (Retin. Homat. +0.75 D. sph.)
January 21, 1935.	+0.50 D.sph. = 20/20.
February 5, 1935.	—0.25 D.sph. ⌯ —0.25 D. cyl. ax. 180° = 20/20+3.
May 1, 1935.	—0.50 D.sph. ⌯ —0.12 D. cyl. ax. 180° = 20/15—3.
June 17, 1935.	no glass = 20/15.

Right Eye:

—0.50 D.sph. ⌯ —0.50 D. cyl. ax. 180° = 20/15—2. No change during the period of investigation.

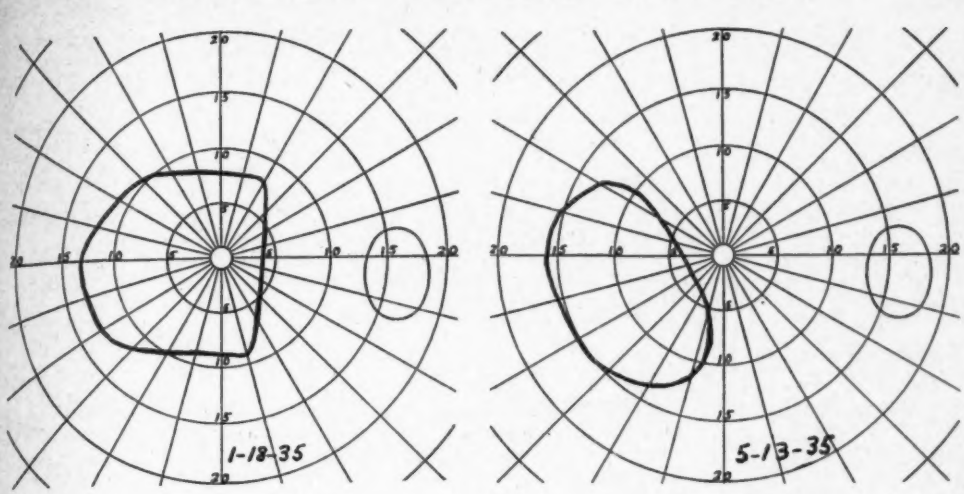


Fig. 7 (Walsh and Sloan). Drawings of positive scotoma seen by patient, case 2.

Perimetric examination

Peripheral fields (see figure 10):

January 10, 1935.	R.E. and L.E. show slight contraction for 1° white, normal limits for 1° blue and red.
February 5, 1935.	As above, but contraction less marked.
May 1, 1935.	O.U. normal limits for 1° white.
June 17, 1935.	As on May 1st.

Blind spots: O.U. slight enlargement. No change throughout period of investigation.

Central scotoma (see figure 11): R.E. No central scotoma demonstrable.

Left Eye:

January 21, 1935.	½° blue: absolute central scotoma. 1° blue: relative central scotoma (test object appears dim). 1° and ½° red, ½° white: no scotoma demonstrable.
February 5, 1935.	½° blue: absolute central scotoma. 1° blue, 1° and ½° red, ½° white: relative central scotoma (test object appears dim). Slightly worse than in previous test.
May 1, 1935.	½° blue and ½° red: relative scotoma (test object appears dim). 1° blue, 1° red, ½° white: no scotoma demonstrable. Marked improvement.
June 17, 1935.	½° red, 1° and ½° blue: relative scotoma. 1° red and ½° white: no scotoma demonstrable. Slightly worse than in previous test.

Positive scotoma

Left Eye:

January 10, 1935.	Patient sees in front of eye a "thin cloud" which is darkest at center and becomes gradually lighter toward periphery. This shadow covers an area approximately 14 degrees in diameter.
May 1, 1935.	Patient states that in February the dark spot became gradually larger and thinner and has now disappeared entirely.
June 17, 1935.	No positive scotoma noticed.

Metamorphopsia

Left Eye:

January 21, 1935.	Parallel lines appear to be bowed in toward fixation point, more marked with vertical than with horizontal lines. Circle seen as an ellipse with greatest diameter in vertical. Lines seem to be doubled.
February 5, 1935.	Vertical lines appear to be convex toward fixation point as before. Horizontal lines show practically no distortion. Circle seems elliptical as before. Doubling of lines no longer present.

May 1, 1935. Vertical lines bowed inward toward fixation point, not so marked as before. Distortion does not extend more than 2½ degrees from fixation point. Horizontal lines and circles show no noticeable distortion.

June 17, 1935. Same as on May 1st.

Micropsia

Left Eye:

February 5, 1935. Letters on Snellen chart viewed at 20 ft. appear about one fourth smaller than with R.E.

May 1, 1935. Difference in size much less than before. Letters on Snellen chart viewed at 20 ft. appear slightly smaller and about 6 inches farther away.

June 17, 1935. Size difference about 2½ percent.

Light minimum (see figure 12.)

Left Eye:

May 1, 1935. Light minimum increased (sensitivity reduced) in area extending from about 6 degrees in nasal field to 8 degrees in temporal field. Greatest reduction in sensitivity in temporal field 5 degrees from fixation point. In this region light minimum of L.E. about 6 times that of R.E.

June 17, 1935. Further reduction in light sensitivity. Light minimum of left eye about 10 times that of right eye in central region.

Literature

With the exception of Batten's brief description of "acute primary macular disease," we have been unable to find in the English or American literature any detailed description of cases similar to these here reported. Batten[1] stated that vision might not be affected sufficiently to cause the patient to seek advice; that it was a disease of young adult or middle life, running a course over some months and tending ultimately to become quiescent; that it affected both eyes, but only one might show a defect in vision; that vision might be affected before any fundus change was visible, giving rise to a partial central scotoma resembling that of retrobulbar neuritis, but without its confirmatory symptoms.

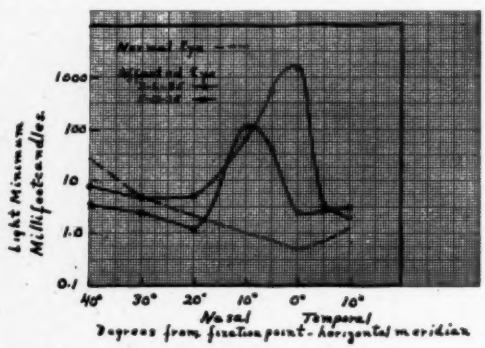


Fig. 8 (Walsh and Sloan). Light sense, case 2.

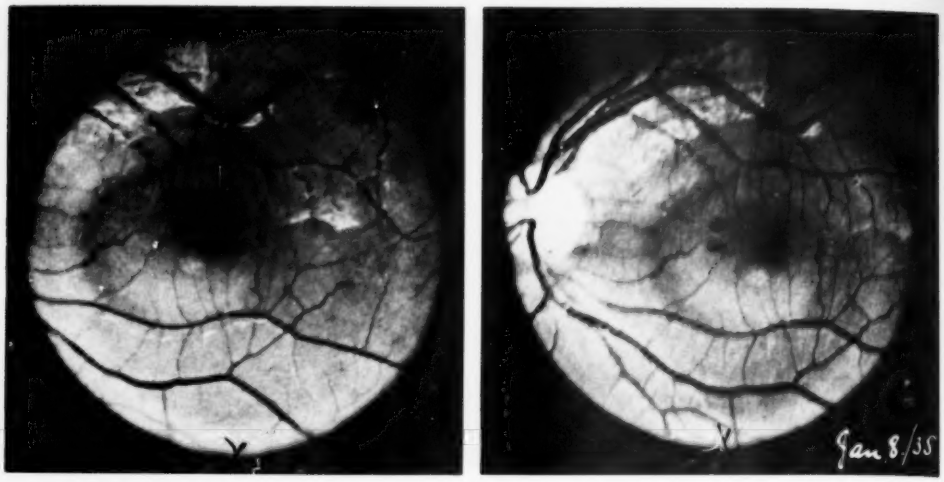
As early as 1866 von Graefe[2] described syphilitic recurrent central retinitis which, except for its greater severity, appears to be very similar. It is characterized by whitish spots in the macular region, a central scotoma of the positive type, and marked micropsia.

Similar cases have, however, been fully described and recognized as members of a clinical entity by several Japanese, German, and Italian observers. Their more important studies are briefly considered.

Asayama,[3] in 1898, first mentioned the occurrence of the disease in Europe.

Masuda,[4] in 1920, reported further clinical studies. He mentioned the occurrence of yellowish-white spots in the macular region, micropsia, and in a small percentage of cases transitory hyperopia of about 1 diopter. He attributed the hyperopia to a lifting of the retina by exudate.

Oguchi[5] laid particular emphasis on the subjective manifestations. He considered the positive scotoma to be the most important symptom. He noted, also, micropsia, metamorphopsia, and recession of the near point. He believed that an exudate, originating in the choriocapillaris, lifted the retina forward and penetrated into it. The posi-



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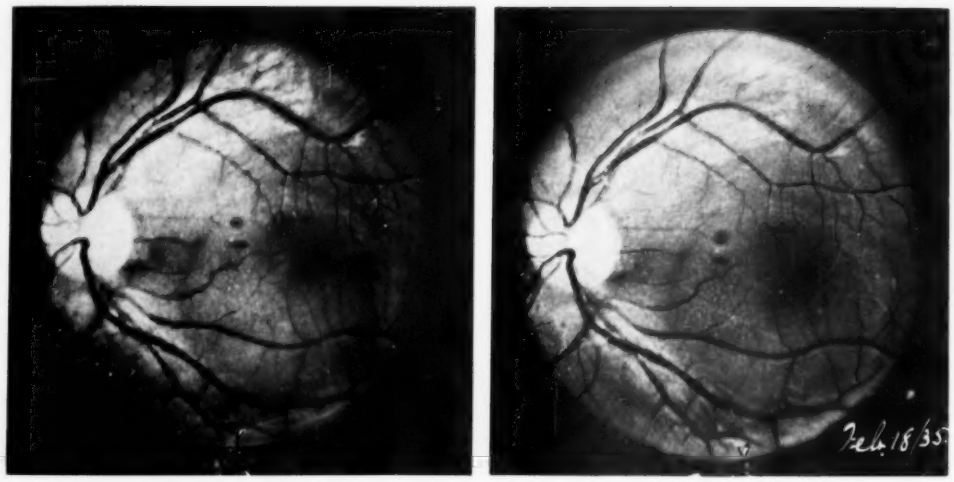

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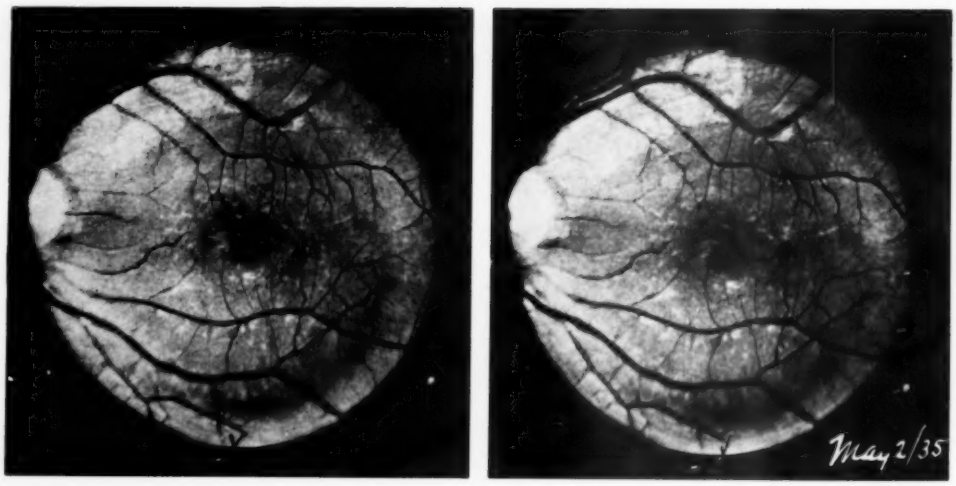

C

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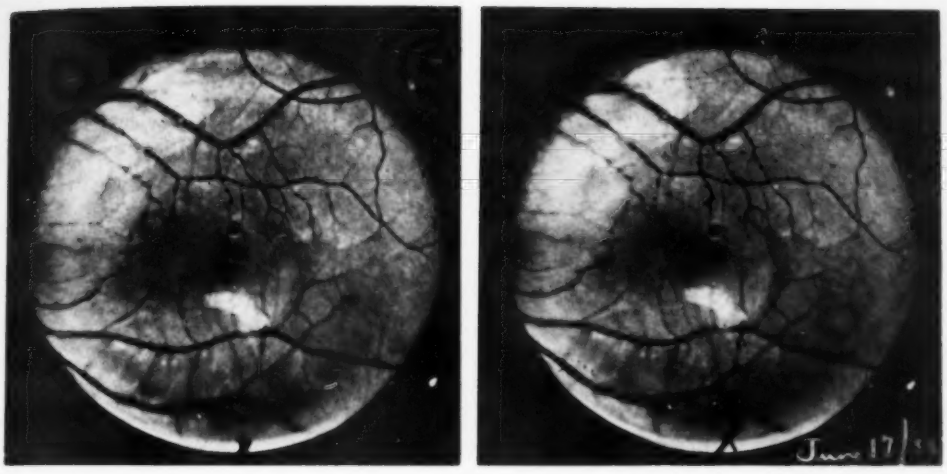

D

Fig. 9 (Walsh and Sloan). Photographs of fundus, case 3. A, stage of detachment; B, appearance of white spots in retina; C, recovery; D, relapse.

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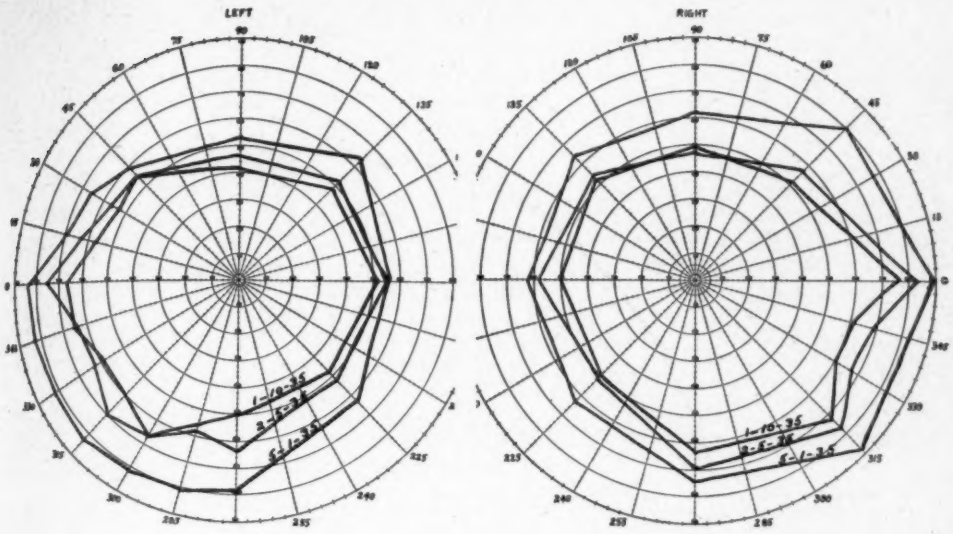

Fig. 10 (Walsh and Sloan). Peripheral fields for 1° white, case 3.

tive scotoma was attributed to the shadow of this exudate. Disease of the accessory nasal sinuses was suggested by him as a possible cause of the condition. He agreed with Masuda's explanation of acquired hyperopia, but believed that the recession of the near point might indicate an effect of the disease on the ciliary muscle.

The question of a possible paralysis of accommodation was further investigated by Abe,[6] who found in nine cases a transitory hyperopia of 0.50 to 1.25 diopters in the affected eye. He found, however, no significant difference in the range of accommodation of the normal and the affected eye.

Kraupa,[7] in 1923, reported two similar cases which he termed retinitis centralis annularis. He described the fundus reflexes in detail and believed that the condition was caused by a circulatory disturbance in the retina.

Horniker,[8] in 1927 and 1929, described 18 cases that were similar to those here reported. He believed that the affection was due to vascular spasm, either on an angioneurotic or an allergic basis.

Guist[9, 10] and Gissy,[11] in 1925, described four cases of preretinal edema. The patients complained of a positive scotoma and slightly reduced visual acuity, and in one instance of micropsia. The fundus examination showed yellowish spots and black pigment spots in the macular region. There were abnormal foveal reflexes. From the nature of these reflexes, and because of the relatively slight impairment of visual function, Guist concluded that there was a transparent biconvex layer of fluid in front of the retina.

Weintraub,[12] in 1929, reported a single case which he diagnosed as macular edema. The patient had syphilis. There were a positive scotoma and markedly reduced vision. Ophthalmoscopic examination showed a large grayish-yellow area in the macular region. Examination with the Gullstrand ophthalmoscope showed that there was no elevation. The retinal vessels passed through the grayish-yellow area without bending. Weintraub believed that these findings indicated a collection of fluid within the retinal layers below the retinal vessels and above the rod-and-cone layer.

Comment

The disease has been termed central chorioretinitis and retinitis centralis by other observers. Such terms are misleading for the course and sequelae are unlike those of the central retinitis or chorioretinitis commonly observed. It

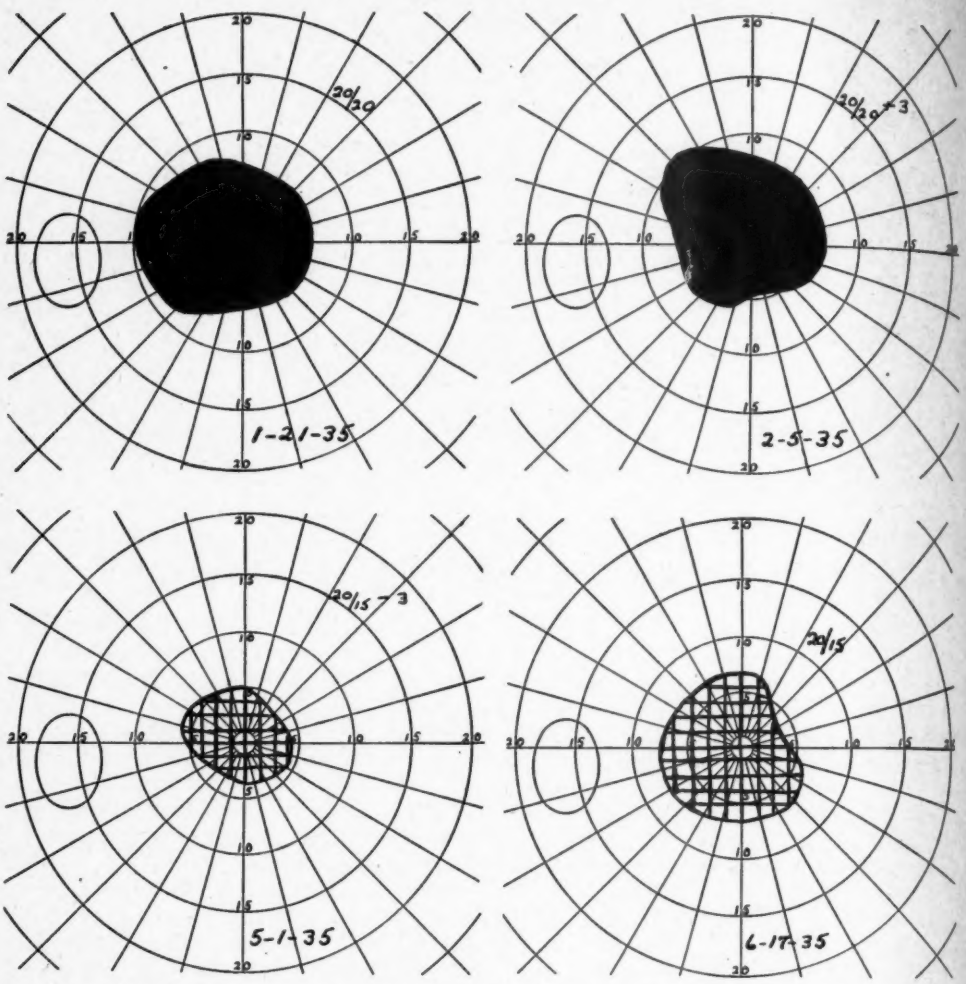

Fig. 11 (Walsh and Sloan). Central scotoma for ½° blue, case 3. Absolute scotoma shown in solid black; relative scotoma, double cross-hatched; "micropsia scotoma," single cross-hatched.

seems more accurate to speak of the condition as "idiopathic flat detachment of the macula."

It occurs most frequently in men between 30 and 45 years of age. Such flat detachments of the macula are probably of common occurrence. During the time the cases here reported were under observation, two members of the visiting staff of the Wilmer Institute (C. A. Clapp and J. S. Friedenwald) each found an exactly similar case in private practice. It seems probable that many of the patients with this disease may never seek advice because of the slight visual loss and the tendency to spontaneous recovery. Some cases may be erroneously diagnosed retrobulbar neuritis.

The etiology is not definitely known. It has been suggested that it is due to a toxic process, probably septic in origin; that it might be secondary to disease of the accessory nasal sinuses; or that it might be due to a circulatory disturbance of the retinal vessels, either angioneurotic or allergic in origin. The patients here reported were carefully studied and although a few scattered foci of infection were discovered and

treated, a definite cause was not established.

The diagnosis cannot be made with assurance until the eye is examined with a binocular ophthalmoscope. Omission of this essential examination probably accounts for the fact that the condition has not heretofore been more widely recognized. The fundus photographs in our cases obviate the necessity of further description of their ophthalmoscopic appearance (figs. 1, 5, 9.).

There is a difference of opinion as to the nature of the swelling at the posterior pole of the eye. We believe that it is due to a localized separation of the retina rather than to a localized edema of the retina and adjacent choroid. The following observations in our cases support this view: (1) The retinal vessels came forward sharply at the margin of the affected area, and retained their superficial position over the entire elevated area. (2) Reduplication of the beam of the Friedenwald instrument was observed in two of these cases. This proved the presence of two reflecting surfaces separated by an optically clear space. The anterior surface, in our opinion, was retina and the posterior surface was pigment layer. (3) The temporary hyperopia decreased as the macular swelling diminished; consequently the percipient elements must have been displaced forward.

The origin of the yellowish spots is not clear. It is generally agreed that they are superficially situated in the retina.

The disease has a duration of from several weeks to several months. There is a marked tendency to relapses of less severity than was the original attack. Cases 2 and 3 exemplify this characteristic. One or both eyes may be affected, usually one at a time. Our cases showed only unilateral involvement.

A positive scotoma was present in the cases here reported. Two of the patients noticed that the scotoma appeared as a dark spot in the daylight, but as a light spot in the dark. On the tangent screen the scotoma showed in general a greater defect for blue than for red. Blue test objects looked greenish-blue or green frequently to the second patient and once to the first patient here reported. The "micropsia scotoma" observed in the stage of recovery has not been mentioned by other observers.

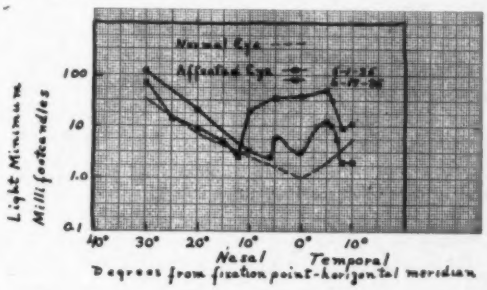

Fig. 12 (Walsh and Sloan). Light sense, case 3.

A positive scotoma is generally considered to be caused by a retinal or choroidal lesion. Scotomas characterized by a greater defect for blue and yellow than for red and green have a similar significance.

Micropsia has been a persistent symptom in the majority of published cases. It may be either dioptric or retinal in origin. The dioptric type is seen in paralysis or spasm of accommodation and in marked anisometropia. The retinal type is due to lesions producing changes in location of the retinal elements. Micropsia occurs in regions where the retinal elements are separated, macropsia in regions where they are crowded together. In the cases here reported, the presence of metamorphopsia with micropsia in a small circumscribed area is indicative of a retinal rather than a dioptric origin.

The temporary hyperopia is, in our opinion, due to shortening of the optic axis caused by elevation of the retina. The maximum refractive change noted, 1.50 diopters, corresponds to an elevation of approximately 0.5 mm. at the fovea. The changes in manifest refraction afford a delicate measure of the amount of elevation at the fovea. Retinoscopy does not check closely with manifest refraction, as was exemplified in our cases. The retinoscopic refraction will differ from the manifest if in the former the light is reflected from

the nonelevated regions of the retina. When the light is reflected from the elevated area the existence of two reflecting layers at different depths results in inaccuracy.

In the cases here reported, comparative determinations of the light minimum of the affected eye and of the sound eye were made at selected points in the central field. These tests were made during the stage of recovery. There was an unmistakable increase in the light minimum in the central field of the affected eye in every case. Further observation on these patients will be necessary to determine whether or not the residual micropsia and reduction in light sense will eventually disappear.

A tentative diagnosis of idiopathic flat detachment of the macula is readily made by consideration of the symptoms. The diagnosis can be made with finality by using a binocular opththalmoscope and observing the progress of the case.

The following conditions require exclusion: (1) Circumscribed detachment of the retina due to tumor. The absence of a gradual increase in field defect and visual loss would serve to rule out this possibility if other signs diagnostic of tumor were not present. (2) Central choroiditis of the usual type. In this the loss of vision is more marked than in the cases here reported. (3) Retrobulbar neuritis. The presence of metamorphopsia, micropsia, and temporary hyperopia would exclude a diagnosis of retrobulbar neuritis. (4) Actinic retinitis. The symptoms and the appearance of the fundus may be similar. Absence of history of exposure to heat or light would preclude this possibility. (5) Syphilitic central recurrent retinitis as described by von Graefe and Weintraub. This manifestation of syphilis is rare, but from the standpoint of appearance could not be differentiated. Judging from von Graefe's description, this process is more severe than is the disease here reported. It is characterized by alternating loss of vision in both eyes lasting only a few days.

No specific treatment has been discovered. Iodine, subconjunctival salt injections, milk injections, atropine, and the salicylates have been used. Removal of foci of infection appears to be the most rational form of treatment.

Summary

The clinical characteristics of a macular affection with three case studies have been presented. It is suggested that these and similar cases are best described at present as "idiopathic flat detachment of the macula." The cases here reported were not due to preretinal edema as described by Guist but appeared to be somewhat similar.

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ON THE GENESIS OF GLAUCOMA

An improved method based on slitlamp microscopy of the angle of the anterior chamber

OTTO BARKAN, M.D., S. F. BOYLE, M.D., AND S. MAISLER, M.D.
SAN FRANCISCO

An improved method of the examination of the angle of the anterior chamber with binocular microscope and slitlamp is described. New facts on the anatomy of the angle in the normal, and on the pathological anatomy of the angle in primary glaucoma are recorded. The direct mechanical cause of the increased intraocular pressure in a certain type of chronic, simple glaucoma is established. The method is a practical clinical procedure which promises to be of value in the future management of glaucoma. Read before the Pacific Coast Oto-Ophthalmological Society, Portland, Oregon, in June, 1935.

Introduction

The method to be described, which we have developed in the course of the last two years, has proved of marked clinical value. From the research point of view it promises to enlarge our knowledge of the genesis and physiopathology of glaucoma. In practice we believe it to be most valuable in the proper management of glaucoma, and from both points of view, theoretical and practical, it has proved, in our experience, to be superior to any of the previous methods used in examining the angle of the anterior chamber.

The importance of being able to examine the topography and microscopic anatomy of the angle of the anterior chamber in the living can be appreciated when one considers that it contains in its wall Schlemm's canal, which, it is agreed, constitutes the main channel of outflow of the intraocular fluid and, therefore, plays a major part in the physiology and pathology of the circulation of the intraocular fluid.

As the angle of the anterior chamber is hidden from view beneath the scleral limbus, its examination in the living has not been possible until relatively recent times.

History

Trantas,[1] in 1907, first saw the angle by means of an ophthalmoscope with a strong convex lens inset, by making pressure with a finger at the limbus outside the point under observation.

However, it was not until the contact glass was used that examination of the angle became at all practical. The object of the contact glass is to shift the refracting surface of the corneal system to the convex surface of the glass, thus making the part of the radius lying in front of the iris membrane appear longer. In an optical construction of this region it will be seen that the areas in which the rays are totally reflected are thereby diminished and thus a greater number of rays are made image forming.

Fick[2] was the earliest investigator to use a contact glass which, when placed upon the eye, deflected the incoming and outgoing rays in such a way that he was able to obtain with the ophthalmoscope a view of the most peripheral part of the anterior chamber. Salzmann[3] using the Fick glass in 1914, and later an improvement thereof, published a study of cases of primary glaucoma paying special attention to the question as to the presence or absence of adhesions between the root of the iris and the corneo-sclera (iris adhesions occluding Schlemm's canal and thereby causing retention of the intraocular fluid). Koeppe,[4] in 1920, using the binocular stationary microscope and slitlamp, studied the condition of the trabecula covering Schlemm's canal. He found the trabecular region strewn with pigment granules and assumed that a cause of primary glaucoma might be the stoppage of its pores with pigment.

Troncoso,[5] in 1925, devised a monocular instrument which he called the gonioscope and to him belongs the credit of popularizing the term "gonioscopy." He has greatly stimulated interest in the investigation of this region and added to our knowledge of it.

Thorburn,[6] in 1927, using a contact glass and a loupe of low magnifications

Fig. 1 (Otto Barkan, Boyle, and Maisler). Showing binocular microscope, Vogt carbon-arc slitlamp and patient wearing contact glass in position for gonioscopic examination.

(×4), studied 100 cases of primary glaucoma and found an open angle and absence of synechiae in the majority of them. He suggested that in the absence of closure of the angle, an obstruction of the trabecular covering of Schlemm's canal might be the cause of the intraocular hypertension.

There are certain defects inherent in each of the above methods and some common to all. Salzmann's magnifications were low. As both his and Troncoso's methods were monocular they did not permit of a stereoscopic image. The sources of illumination were insufficient and cast shadows that produced false appearances. Koeppe examined his subjects in the upright position and was thereby limited to a view of the nasal and temporal portions of the circumference. Because of this and the difficulties and time-consuming elements inherent in his method he gave it up. Thorburn examined the subject in the supine position and obtained a view of the whole circumference by moving around the subject, but he also limited himself to low magnifications and a weak and diffuse source of illumination.

We have become convinced through personal experience of the defects of these methods and further have found that, with the exception of Koeppe's method, which he discarded, they all produce appearances of light, shadow, and color that lead to false interpretations of the underlying anatomical structure and texture.

Just as these gonioscopic methods produce optical artefacts and false appearances in the living so also anatomical sections and preparations of enucleated eyes, to a study of which our knowledge of this region has been limited in the past, are replete with artefacts, due to the processes of hardening and embedding which shrink or swell the delicate ocular tissues, thereby altering relationships and disturbing and dislocating the natural topography. Moreover, such anatomical specimens have, in the nature of things and with but few exceptions, been limited to eyes that have come to enucleation in the last stages of disease.

Method

It was our object, therefore, to obtain a true picture and a true interpretation of what is seen in the angle of the living normal eye in the early as well as in late stages of disease and to be able to trace the development of pathological conditions from their earliest beginning.

We began our investigations more than two years ago with the object of overcoming the aforementioned defects and feel that we have in large measure succeeded. Our purpose was to obtain a highly magnified stereoscopic view of the angle of the anterior chamber with slitlamp illumination and with equal ease throughout the whole circumference of the angle, in a short space of time, and without discomfort to the subject. For this purpose we devised a method of using the Zeiss binocular

corneal microscope and the Vogt arc slitlamp so adjusted that the method answers the above conditions and affords a true picture of the angle, its topography, and its tissue elements. One obtains thereby an extraordinarily complete physical conception of the structures, relationships, and tissue elements of this region (including the zonule, ciliary processes, and so forth, where a coloboma is present) such as one cannot obtain in any other way. By directing a light upon the sclera posterior to the limbus (posterior gonioscopy of Trantas), the angle can also be examined by transillumination, further observations made, and confirmation obtained of appearances as seen by direct illumination.

Figure 1 shows a rigid fixture suspended from the ceiling that is adapted to coarse and fine adjustments for lowering and raising the microscope. Universal joints permit an unlimited range of positional adjustments. The lower section, carrying the instrument, may be folded upward; this movement, together with the complete telescoping of the tubes, serves to keep the apparatus out of the way when not in use. The source of illumination is the Vogt arc slitlamp mounted independently on a strong metal stand which moves freely on three rubber-tired casters. An extension of the stand equipped with universal joints carries the slitlamp arm and is adjustable to any desired position. Positional requirements are furthered by the use of a Kleefeld mirror properly mounted to direct the light from any possible angle. For examination of the anterior-chamber angle in conjunction with the contact glass of Koeppe, we have used total magnifications of ×25. This magnification, however, combined with the magnifying properties of the media of the eye and of the contact glass, results in a total approximate magnification of ×40. Higher magnifications than this can be used but are not advisable for observations of the chamber angle due to aberrations produced by the extreme angle of observation. Our method combines the rigidity of the Koeppe technique and the flexibility of the Troncoso method without their respective limitations.

Anatomy of normal angle

We have found that in the normal human eye the angle is always narrowest above and widest below with gradual transitions in the intervening circumference, and not of equal width throughout as has been assumed up to the present time. The stromal iris processes (fig. 2) which bridge the angle from the iris root to become inserted into the angle wall, and which are usually very sparse, may in some individuals be so numerous as to resemble in number and appearance the pectinate ligament and spaces of Fontana that are found in the pig and other animals. They would seem to represent a phylogenetic remnant of this structure. The sclero-corneal trabecula, which separates the aqueous from Schlemm's canal, and, in some cases, the delicate arborescenses of the uveal meshwork, can be distinguished. The advancing senile sclerosis of the trabecula can be determined and can be correlated with a fair degree of accuracy to the number of calendar years. Likewise, the increasing physiological accumulation of pigment granules can be observed with advancing years and can be demonstrated in some cases to have its origin in the iris pigment epithelium from which it is carried by the aqueous and deposited by its currents and by gravity upon the lower angle wall.

The causal factors of glaucoma

Quite different in character and distribution are the sclerosis and pigmentation of the trabecular part of the angle wall which we have found to be a frequent if not a constant finding in so-called primary glaucoma. Pigment dust and granules permeate the trabecula over Schlemm's canal (figure 2). Some cling to the surface and project from it into the aqueous like barnacles on the hull of a ship; others infiltrate the pores, and pigment dust permeates to the walls of Schlemm's canal itself. The amount of pigment deposition as well as its extent relative to the total circumference is closely correlated to the

stage of the glaucomatous process, its duration, and so forth. This can well be judged by comparing the two eyes of a glaucomatous individual which present different and known stages in the development of the disease. Moreover, some pigmentary block of the trabecula and Schlemm's canal can be

noninflammatory cases of glaucoma in which the entrance to the angle is patent and often wide, it appears obvious to us that stoppage of the pores of the trabecula constitutes the immediate and sole cause of the reduced outflow of intraocular fluid (retention glaucoma). According to our observations to date

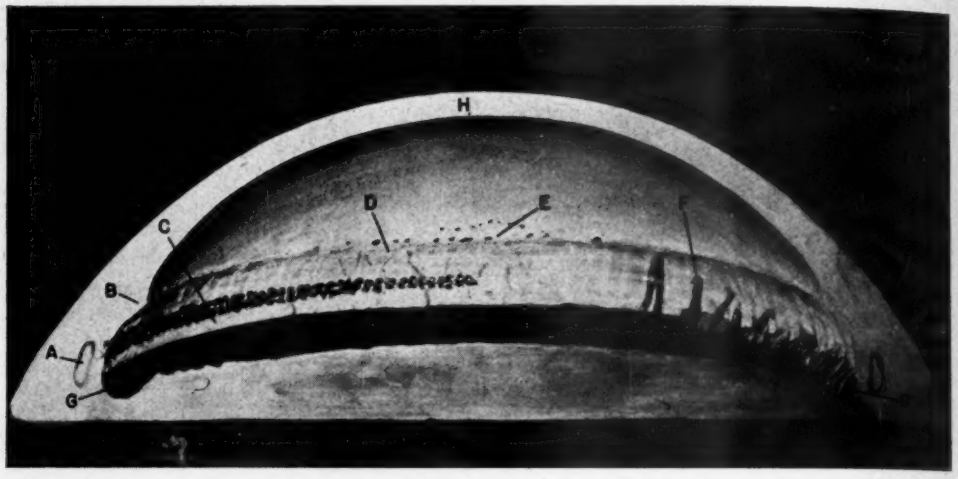

Fig. 2 (Otto Barkan, Boyle, and Maisler). Photograph of a model representing one half of the anterior chamber and showing the angle as it appears upon examination with our gonioscopic method: A, Cross section of Schlemm's canal. B, Internal annular ring of Schwalbe. C, Pigment granules obstructing the pores of that portion of the sclero-corneal trabecula which covers Schlemm's canal. Immediately posterior to this is the white line which corresponds to the scleral spur. D, Inner-angle wall showing striations or lamellae of sclero-corneal trabecula and a few dark branching fibers that represent what the anatomists have termed the uveal meshwork. E, Physiological accumulation of pigment granules on internal annular ring of Schwalbe. F, Iris processes (or what we believe should be called the uveal meshwork, which is a vestigial remnant of the so-called pectinate ligament found in animals). G, Sinus of the angle—anterior surface of ciliary body. H, Cornea.

The pigment block of the trabecula is shown in one half of the model. Iris processes are represented in the other half.

shown to have occurred in the second and apparently nonaffected eye of such an individual with normal fields and tension of this eye, from which it may be concluded that the pigmentary block is primary and the cause rather than secondary and the result of the hypertension.

When the surface granules are not pronounced or, as occasionally occurs, when as a result of a cyclodialysis operation they have been scraped off, Schlemm's canal itself can be seen for the first time in the living, by virtue of this intravital staining with brown pigment, as a sharply delineated brown band.

In the compensated, simple, chronic,

of some one hundred cases of glaucoma with our method, this would seem to be the first stage of many cases of chronic glaucoma. It would also seem to constitute the first stage of many cases of decompensated chronic, inflammatory glaucoma in which the iris root has become adherent to the angle wall and thus occludes Schlemm's canal. This becomes evident through the fact that when these peripheral adhesions have been separated by operation from the angle wall (cyclodialysis), such a pigment-blocked Schlemm's canal is exposed to view. Obviously, then, the pigment block of Schlemm's canal antedated the formation of the iris adhesion and was the first mechani-

cal factor in the development of the hypertension. Furthermore, there can be no doubt, in our opinion, that the pigmentary block of Schlemm's canal obstructs the outflow of aqueous sufficiently to cause the intraocular hypertension, when one compares the degree of blockage in a given case of primary glaucoma (as we had occasion to do) with cases of secondary glaucoma in which the increased tension is caused by visible and known amounts of blockage through exudate or lens débris lying in the angle and obstructing the canal (or more specifically the trabecula covering the canal).

We feel that these changes are characteristic of one great type of primary glaucoma. They confirm those theories of pigment glaucoma which have been suggested on the basis of anatomical examination in a few isolated instances of early compensated glaucoma by Levinsohn[7] and Schieck[8] among others, and of slitlamp findings of pigment in the anterior segment of the living eye by Koeppe.[9] These theories, in recent years, have been practically discarded, as may be gathered from Meesmann's statement[10] in his Atlas (1927).

In what we regard as the other type of glaucoma (or in what may, in some instances, prove to be another stage of the first type mentioned) a narrowing of the entrance to the angle between the anterior-border ring of Schwalbe and the iris root is characteristic and is the sole anatomical anomaly that can be seen gonioscopically in the region of the angle at this stage. We have already pointed out that a thickening or obstruction of the sclero-corneal trabecula may be present (and we believe often, and perhaps usually, is) before the narrowing of the entrance to the angle takes place. This narrowing seems to be due in many cases to a general advance of the iris-lens diaphragm and in some to a ballooning (bombé) of the iris. There is evidence to suggest that the latter is caused by an exaggeration of the physiological seclusion of the pupil (Curran[11] among others). When transient or partial contacts are established (as, for instance, in mydriasis during the physiological pupillary play, or more especially in dark-room or artificial mydriasis) between the surfaces of the peripheral part of the iris and the anterior-border ring of Schwalbe, it seems evident that with this partial transient closure of the angle increase of intraocular tension must result. If the obstruction is sudden, and it may be either a sudden and total block (totality in the sense of the entire circumference), or, in the case of a previous block, of part of the circumference, when the remaining portion which had been sufficient to compensate the intraocular pressure is suddenly blocked (which we have definitely seen to occur as a result of artificial mydriasis in the course of observation of individual cases), and if this contact or occlusion is not immediately relieved, an acute attack of intraocular hypertension occurs with all the common signs of decompensation and congestion that constitute the picture of acute glaucoma.

One is able, therefore, by previous examination of the angle, to foresee the effect of mydriasis in the individual case and to guard oneself against it; thus, for instance, after a cyclodialysis operation, artificial mydriasis is the routine postoperative procedure. In the preoperative examination of a patient before cyclodialysis was performed, we once made an incidental and exceptional notation in our record that the topography of the angle was such as to lead one to expect that dilation of the pupil would cause an acute attack of increased tension. The operation normalized the tension, and on the seventh day after operation we instilled one drop of epinephrine bitartrate to break down some slight pupillary adhesions, such as not uncommonly form after cyclodialysis. The result was an acute attack of glaucoma. In trephination, this danger does not exist because in this operation one does not depend upon the patency of the filtration angle, the trephine opening having been made to take its place. Indeed, we have found the angle to be no longer of functional value in many trephine cases, it being occluded by peripheral-angle adhesions in a large percentage of them. In some of these

we believe the adhesion to have followed and to have resulted from the trephine procedure rather than to have antedated it.

Conclusion

As a result of our investigations we believe that obstructions which prevent access of aqueous to the angle and to Schlemm's canal (namely, sclerosis of the trabecula, stoppage of its pores with pigment, and narrowing of the entrance to the angle, which last named may finally lead to its closure) are the direct mechanical causes of many and perhaps most cases of primary glaucoma.

The term secondary glaucoma has been and is used today for those cases in which the cause of the hypertension depends upon recognizable or apparent changes of the ocular tissues. It would seem to us that so-called primary glaucoma, as described above, should, in view of this knowledge, be classified as secondary glaucoma. The distinction between primary and secondary glaucoma would seem actually to be a distinction without a difference, unless it be in the degree of blockage or depend upon our lack of recognition of the mechanical factors in these so-called primary cases.

True primary cases, on the other hand and in our opinion, are those in which the obstruction factor is absent (nonretention glaucoma), such as the rare cases of an apparently true vasomotor or neurogenic type that have been described in the literature, in which hypersecretion or excess formation of aqueous plays the major role. We had occasion one year ago to observe a true case of this type which occurred subsequent to a severe mental shock in a 34-year-old woman. In this case we were able to prove the angle findings to be absolutely normal; past and family history were negative. In the course of three weeks of pilocarpine instillations, the much-increased intraocular pressure of the right eye (tension, McLean, R.E. 70 and L.E. 28) returned to normal and has remained normal without myotics ever since. It would seem that many cases of retention glaucoma, especially of the second type, also exhibit the neurogenic vasomotor factor to a greater or less extent, and that this latter factor may account for the clinical variations and exacerbations during the course of the disease.

If our observations and conclusions are confirmed, a further barrier to the knowledge of the genesis of glaucoma has been removed and we are faced with the question as to the reasons why the iris sheds its pigment, for the occasional immoderate sclerosis of the trabecula, and for the advance of the iris-lens diaphragm (or bombé) of the iris which narrows the entrance to the angle. These may have to be sought in dysfunction of the sympathetic with local vasolability, in alterations in the constitution of the aqueous or vitreous due to biochemical changes locally or constitutionally, or in endocrine disturbances.

We are publishing our method and a brief survey of our observations and conclusions in the hope that they will help to fill the hiatus in the knowledge of the anatomical changes and mechanical factors involved in the genesis of glaucoma. Further reports on the clinical aspects, the application of the method to the surgery of glaucoma, operative indications, and the choice of operation will be published in the near future in the ophthalmological journals.

Summary

1. The angle of the anterior chamber is of unequal breadth in the normal eye. It is always narrower above than below.

2. Sclerosis of the trabecula and stoppage of its pores with pigment are the cause of one great type of chronic glaucoma.

3. Another type of chronic glaucoma is characterized by an advance of the iris-lens diaphragm which narrows the entrance to the angle and forms peripheral iris adhesions. The latter prevent outflow of aqueous into Schlemm's canal.

4. Blockage of the filtration angle by peripheral iris adhesions may be a later stage of the first type of glaucoma in which the entrance to Schlemm's canal

is sclerosed and obstructed with pigment.

5. Exacerbations in the clinical course of the disease are caused by increase of obstruction of the filtration angle or by neurogenic factors.

6. Our method is a practical, clinical procedure and we believe constitutes a marked advance in the medical and surgical management of glaucoma.

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HEREDITARY MACULAR DEGENERATION

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The author divides these fundus pictures into three general types: those with a number of soft, white spots or dots throughout the periphery or about the macula, the severe cases with early pigment changes in the macula itself and poor vision, and finally those that simulate partial coloboma of the choroid. These categories are exclusive of that known as amaurotic family idiocy. While there is no picture that seems to be typical of all the cases in the same group, yet the fundus characteristics are very similar for cases in an individual family and this is true also of the age at which the changes appear.
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From time to time patients with very moderate macular changes but very poor vision have been reported, whereas patients have been observed with striking changes in and about the macula in whom the vision was excellent. Naturally, the cases in which there was poor vision have been more thoroughly studied than those in the latter group. Hutchinson and Tay described senile types in 1875, and Nettleship reported cases of guttata choroiditis in 1884. About 1900, Batten and Doyne reported cases with numerous somewhat large, soft, white spots scattered throughout the fundus, in which vision was normal. Batten used the title "guttate choroiditis" for the clinical picture he found, whereas Doyne employed the title "peculiar choroidal condition with normal vision." It has been my privilege to see a number of these cases, some in my office but many more at the Brooklyn Eye and Ear Hospital. I have no exact data bearing on the rate of occurrence, but the milder cases are among the more common of the rarer types of fundus pathology. Finding no description of this particular type in the literature, my interest was aroused, but what I believed would be a limited number has proved to be a large and most interesting group. Omitting from this discussion the very severe and probably the most typical of hereditary (or familial) macular degenerations, amaurotic family idiocy, there would appear to be three general types of cases: those with a number of soft, white spots or dots throughout the periphery or about the macula; the severe cases, with early pigment changes in the macula itself and poor vision; and, finally, those that simulate partial coloboma of the choroid.

The milder form of macular degenerations of the first type exhibits a number of large, white or yellowish-white spots about the macular area, the macula itself escaping until later in life. In young persons, these are soft, round, white spots, but in older patients they have the appearance of rain fallen on dust. In young persons the vision is always good, but in the older patients some loss of visual acuity has usually been incurred. One of my patients, a woman of sixty-seven years, has vision in the right eye of 6/12 and in the left eye of 6/18+. The youngest patient in whom this was found was fourteen years old, but this does not indicate that the condition does not occur earlier. It has never been my privilege to follow one of these cases through a period of years, but I believe that eventually the vision does suffer somewhat, for the older patients do not quite read 6/6; on the contrary, however, in no instance of this character has the patient ever been greatly handicapped. I have not found more than one case of this type in a family, but several family groups with more than one member so affected have been reported.

So far as I know only one microscopic examination of this condition has been reported, and that was the work of Treacher Collins, who found the elastic layer of the choroid very much thickened by hyaline changes, with nodes here and there that threw back the light of the ophthalmoscope to give the impression of the soft, round, white spots. The changes in the lamina vitrea take place behind the

retina, and exist for a long time without seriously affecting the function of the pigment layer or the rods and cones, and do not interfere with the light rays impressing them. The elastic lamina was formerly considered to be merely a partition, but now some observers are beginning to suspect that the structure governs the transmission of nourishment from the choriocapillaris to the rods and cones and pigment layer and the return of waste products. It seems that the thickened lamina can function very well, but eventually the foveal cones suffer and the vision begins to fail. This belief is borne out in the patients coming under my care, for although the number of cases seen in persons over forty-five years of age is not large, they all had suffered some loss of vision. This theory regarding the function of the elastic lamina would also explain the changes of senility and presenility, as the elastic tissue of the body is the first to feel the effects of age.

A second form of this first type is also characterized by white spots, but they are very much finer and much more numerous. If the condition does not progress, the macula often escapes entirely, but in progressive cases it is finally affected. The spots have been found first in the periphery, and are usually associated with night blindness. The condition may remain stationary, with normal central vision and fair-sized visual fields, except in reduced illumination. A few cases have been reported with these same points of white in the periphery and with no other symptoms. The severe cases go on to blindness, and some of them have exhibited black pigment corpuscles in the extreme periphery not unlike retinitis pigmentosa. The optic disc may become very white as the result of atrophy. These cases may be considered as a link between macular degeneration and retinitis pigmentosa, and have been described in the literature under the title of retinitis punctata albescens. Retinitis pigmentosa begins in the periphery and affects the macula very late, whereas in the typical macular degenerations the macula is first affected. This distinction cannot be applied too literally and is really typical of the severe cases, such as amaurotic family idiocy, and of the next variety to be discussed with pigment changes in the macula and exceedingly poor vision.

The second general group of macular degenerations is marked by changes beginning in the macula itself. Fine black pigment is deposited there, resembling fine grains of snuff. Vision fails early, and in the typical cases there is the effect of a central scotoma. Although it seems that these cases may remain stationary at any point, progress of the disease takes the form of a tapetoretinal degeneration, exposing the choroidal vessels, which later show the changes described as sclerosis of the choroidal vessels. It is a well-established fact that the earlier the changes begin, the more severe the condition is likely to be, and this applies not only to the vision, but to associated cerebral changes as well. This seems to be true of all hereditable ailments: the earlier its appearance, the more severe the disease is apt to be. Patients in whom the macular changes of the severe type appear before puberty are prone to suffer mental deterioration as well, but if the disease is delayed until after this epoch, the symptoms are limited to the eyes. In most of the cases of this type central vision, at least, is lost, and in many there is progression even to greater loss up to complete blindness.

The third form of hereditary macular degeneration resembles a partial coloboma of the choroid in the macular area. Not many of these cases have been published, and the range of vision reported is from very poor to even normal vision in one eye and fair vision in the other. My personal experience with this type is limited to one case, that of a woman in the late fifties. She came to secure better reading glasses, because those she had been using for several years had rather suddenly failed her. We could not improve her vision, and she went on wearing +4.00 D. sph. O.U. for distance and +8.00 D. sph. O.U. for near. This somewhat unusual prescription would indicate that her vision was not

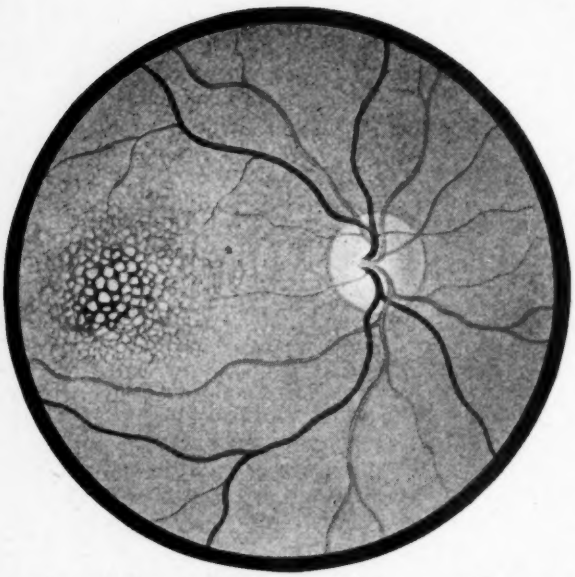

Fig. 1 (Lloyd). Mild type with large white spots. Vision unaffected.

so good as she believed it to be, and we are led to consider that her maculas carried on rather well under difficulties, but eventually failed, just as happens in the milder cases. We could not give her better vision than No. 12 Jaeger, but she assured us that she had been able to read the usual newspaper print.

Those lesions that appear to resemble partial coloboma of the choroid might be considered as lesser grades of typical colobomas of the choroid, which are sometimes familial. There should be no difficulty in making the diagnosis of the regular colobomas, but the family incidence is likely to escape attention. The extrapapillary coloboma of Lindsay Johnson can more readily be mistaken for a healed tubercular lesion, and, so far as I know it has not occurred in more than a single generation nor in more than one person in a family. Senile and presenile cases, which were formerly considered as separate entities, are now rated as delayed manifestations of hereditable influences, and are usually less severe than those that appear earlier. Behr states: "Senile macular degeneration is a special type of hereditary macular degeneration, distinctly hereditary, and the primary cause is a premature death of the maculoretinal neurons. It begins in the fovea and spreads laterally in all directions, and becomes less circumscribed when the outer layer is involved. There is no inflammation and no pigment except what follows hemorrhage. The choroid and the nerve are not involved." Behr does not explain how he came to believe that senile macular changes were familial or hereditary, but no one could question his report of the changes found. I have not been able satisfactorily to settle the questions of heredity in presenile and senile conditions, because in the later years of a man's life his family is scattered, examination of brothers and sisters is rarely possible, and as a rule, he knows nothing of the ocular history of his

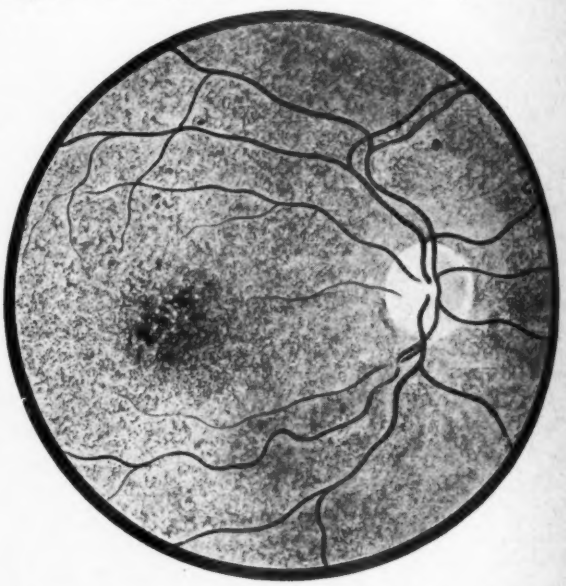

Fig. 2 (Lloyd). Retinitis punctata albescens. No central vision, night blindness and color blindness in a 27-year-old female. Mother and brother have normal vision with white spots in and about the macular area.

family. The macular changes, however, are often but a part of a characteristic picture. Usually the condition begins with complaints of poor vision, while the patient is able to read 6/6. Closer questioning often brings out the fact that things appear to be darker than usual. Positive scotomas hover about the fixing point, and finally everything the patient looks at is blurred by a cloud or a mist and the visual acuity fails. Like all positive scotomas, these annoy the patient. Generally one eye is affected before the other, and the visible changes in the macular area appear some time after the condition is established. Memory fails, and speech becomes difficult, owing to the inability to recollect an important word in a sentence, or because the wrong word slips in and confuses the meaning. The patient becomes irritable and unreasonable, and finally even close friends are no longer recognized. Toward the end of his days the patient is in a pitiable mental state. Hutchinson and Tay, as far back as in 1875, described a group of symmetrical macular changes in elderly patients. Their patients were three sisters and five other isolated persons. The sisters were sixty, fifty, and forty years old, respectively, and the features noted were: "Limitation to region of macula, both eyes alike, disc and choroid otherwise healthy, patients past middle life but in good health, and absence of pigment except what might follow hemorrhage."

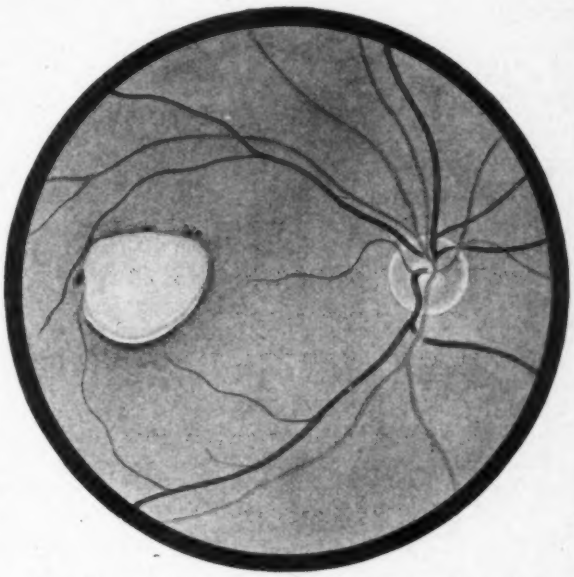

Fig. 4 (Lloyd). Type with the appearance of a partial choroidal coloboma. Vision good until late in life.

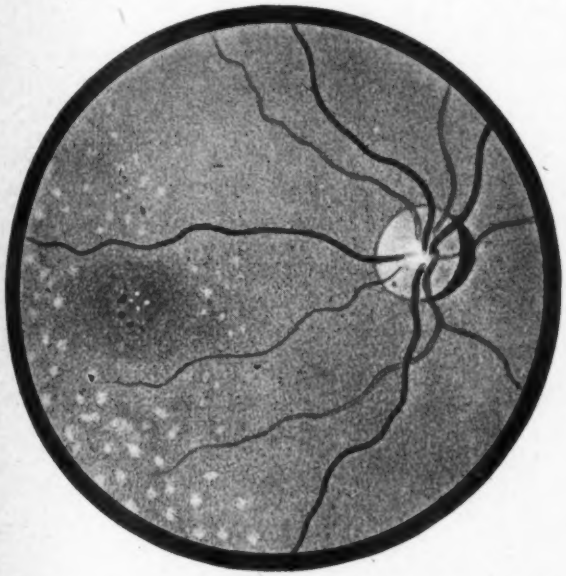

Fig. 3 (Lloyd). Severe type beginning with pigmentation in the macula. Vision = 20/200. Girl of 14 years, sister affected.

The formerly separate case groups now included in this one large group of hereditary macular degeneration are the choroiditis guttata of Tay and the honeycomb choroiditis of Doyne; the more serious group —maculocerebral degeneration (familial) of Oatman; familial congenital macular degeneration of Best; progressive macular degeneration of Batten and of Stargardt; the tapetorentinal degeneration of Leber, and the retinitis punctata albescens (Gayet). The periods of incidence are:

Birth—Transition from intrauterine life.

6 to 8 years—Beginning of second dentition.

14 years—Beginning of sex life.

20 years—Sex maturation and end of skeletal growth.

50 years—Beginning of senile involution.

Senility—Beginning of dissolution.

Cases in juveniles are by far the most common.

The condition is either hereditary or familial, and if hereditary, the transmitting female is affected. Consanguineous marriages have frequently been recorded in the case histories.

There is a distinct tendency for other neuro-ophthalmologic conditions to coexist, as, for example, (a) color-sense defects up to total color blindness; (b) total or incomplete optic-nerve atrophy with or without peripheral changes, suggesting pigmentary degeneration of the retina or honeycomb choroiditis. Some of these cases might be regarded as connecting links between the pigmentary degenerations and the macular degenerations.

No one ophthalmoscopic picture seems to exist that may be regarded as typical of occurrences in the same group, but the fundus picture is very similar for cases in an individual family, and the same is true of the age at which the lesions appear.

The characteristics of the disease are —(1) its familial or hereditary character, and (2) (with exceptions) the changes are bilateral, look exactly alike, begin at the same time, and the manner of development and rate of progress are the same for the individual family.

In examining these cases, the binocular ophthalmoscope of Gullstrand has been of greater use than red-free light. The former instrument clearly demonstrates the presence of the white spots located in the deeper layers of the retina or in the choroid, whereas red-free light will show very fine retinal changes in the macular area not otherwise seen. This last advantage is not of great importance, since the ordinary hand ophthalmoscope will disclose all that is necessary to formulate the diagnosis or suggest the type of the ailment which will be determined definitely by the history of the family.

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NEW AND PRACTICAL CHARTS AND LIGHTING FOR TESTING VISUAL ACUITY AND LOCATING THE ASTIGMATIC AXIS: SIMPLE, STANDARDIZED, AND COMPLYING WITH MODERN REQUIREMENTS

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An attempt has been made to meet the need for better standardization of visual-acuity tests. The charts constructed for this purpose have been built on the principle of rotating dials. The importance of the ability to select and isolate any one object is emphasized. The suitability of the broken ring of Landolt is demonstrated. Attention is called to the importance of variable, standardized illumination, and simple lamps for securing such illumination are described. Read before the American Ophthalmological Society at Hot Springs, Virginia, June 5, 6, 7, 1935.

The great importance of refraction in the study of the eye is no longer questioned. The length of time consumed in making a careful estimation of refractive errors is a matter of grave concern to all engaged in refraction. There is nevertheless, an astonishingly large amount of improvement still to be desired in the average equipment for testing and standardizing visual acuity, and for the determination of the amount and the axis of astigmatism. The various charts commonly used have all too frequently served to embarrass the examiner, as when the possessor of an amblyopic eye has passed some test of vision by the simple expedient of committing the chart to memory previous to examination. It is impossible for any one attempting to gauge the progress of a group of cases by checking the vision at frequent intervals over a course of a number of years not to be impressed by the futility of asking even the most coöperative of patients to read over the same set of letters repeatedly and of expecting to arrive at even a remotely accurate conception as to variation in the lesions thus indicated. A chart that could not be memorized would be of the greatest value in the study of such a group. It would also be of value in the examination of applicants for industrial positions, in issuing licenses to drive motor vehicles, and the like. Much time could be saved, and greater accuracy of results could be secured if a chart were available so constructed that it would be unnecessary to examine each candidate in a separate room in order to keep subsequent applicants from familiarizing themselves with the sequence of objects on the test chart. Nor is the situation with regard to the usual lighting conditions under which such examinations have been conducted any better. Very rarely is any effort made even to estimate the number of foot-candles employed. Daylight of varying quality and amount, falling on more or less soiled and dog-eared letter cards, is the usual equipment. It is these conditions that have led to the construction of the compact and inexpensive charts and lamps to be described.

Although not the primary purpose of this discussion, a brief analysis of the function of test objects in general is necessary. Numerous committees have been appointed to investigate this subject, and lengthy reports have been submitted by such committees as well as by independent observers, and yet the controversy continues. Certain definite facts, however, appear to have been established.

It is apparent that test objects have, in general, three primary functions to fulfill: (1) to serve as a standard of visual acuity; (2) to point out astigmatic errors; and (3) to assist, with the greatest possible accuracy, in the selection of the proper correction for such errors as are found. The first of these requirements is met by the broken ring of Landolt. Since there is but one detail to be observed, and that detail meets with the demands of the Snellen standards, this test object is well suited for the construction of a rating scale, and has been adopted as the interna-

tional standard. The second requisite, in the opinion of the writer, is best met by the astigmatic dial of Dr. Lancaster, when the radiating lines are arranged in a complete circle, especially when used in conjunction with the crossed V's of the Green charts. The greatest accuracy may be obtained, however, with the broken ring, as suggested by Drs. C. E. Ferree and Gertrude Rand.[1] The figure is simple, yet it tests well the resolving power in the various meridians. In the absence of astigmatism the opening in the circle will be seen equally well in all directions. But if the resolving power should be reduced in any direction, the break will be less easily discerned in that direction than in any other. Recently Ferree and Rand[2] have suggested a means of markedly increasing the accuracy of this examination by substituting for the ring with the single opening one with a double break, the two having their centers 90 degrees apart. A point located midway between these centers will indicate the axis of astigmatism when both openings are seen with equal distinctness, or require the same illumination for their simultaneous discrimination. The third function is best subserved by a figure of considerable complexity, constructed with numerous acute angles, such as the maltese cross suggested by Dr. S. Judd Beach.[3] This figure abandons the standard of Snellen, substituting for the five-to-one ratio of length and thickness of stroke a ratio of ten to one, this having been found by its originator to be more satisfactory, since it is sooner distorted by imperfect focusing. In the light of the recent investigation, such a change appears to be justified. Dr. Adler and Maurice Fliegelman,[4] writing on "The influence of fixation on visual acuity," have pointed out, as was previously done by Anderson and Weymouth,[5] and later by Averill and Weymouth[6] and now confirmed by themselves, that even with the most perfect fixation the eye is never at rest, and that, therefore, the image of objects fixated "does not rest on a fixed pattern of foveal cones, but is carried back and forth over an area of the fovea," thus stimulating a large number of cones. It would, therefore, appear that the correspondence between the minimum separable and the size of the foveal cones is coincidence rather than the result of cause and effect, a conclusion further strengthened when the far more minute aligning power of the retina is taken into account.

In the light of the foregoing observations, and because it best fits into their mechanism, the broken ring has been adopted for general use in these charts. Supplementary discs, however, carry the Maltese cross for the purpose previously described, additional broken rings, letters of the alphabet, and blank spaces, wherein the individual operator may draw, if he has the time and the patience, such additional figures as he may desire.

In the construction of satisfactory test charts certain essentials should be considered. The sequence of characters must be as difficult to memorize as possible. It is vital that the arrangement be such that the test objects may be shown singly or two at a time, or in large numbers. The sequence should be subject to variation, as desired. The whole outfit should be compact and easily portable. The figures of all sizes should receive the same amount of illumination. The cost of such apparatus should be low enough to make it practicable for use in factories, schools, and similar places, and at the same time it should, with a slight increase of cost, permit of such elaboration as would meet the most exacting requirements of clinics or private practice.

Two models have thus far been constructed. The first was designed to meet at low cost the simpler needs of an accurate visual test; the second was made, at a slightly greater outlay, to comply with the more complex requirements of accurate tests of refraction, including the measurement of the amount and the axis of astigmatism. The first model (figs. 1, 2, and 3) was finished some months ago. Since that time it has been used with great satisfaction, and has proved an accurate test for visual acuity, obviating error due to memorization or familiarity. It is based upon the principle of rotating dials con-

Fig. 1 (M. H. Post). First model. 6/60 ring exposed.

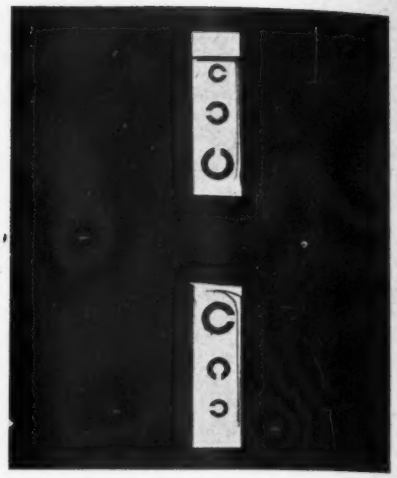

Fig. 2 (M. H. Post). First model. 6/30, 6/20, 6/15 rings exposed.

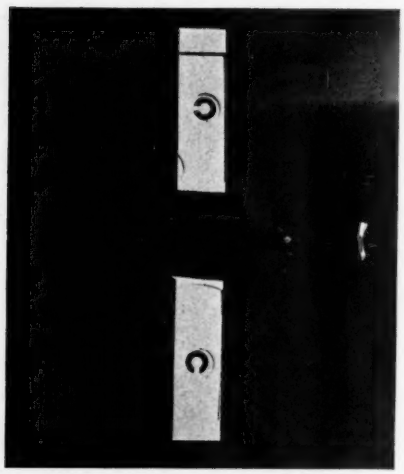

Fig. 3 (M. H. Post). First model. 6/20 rings exposed.

trolled by manual operation. The essential parts are a housing, a shutter, and a test-object dial, the two last being subject to rotation upon a central axis. There are three apertures in the front housing—one central, about 4¼ inches in diameter, and two rectangular, 2½ by 7 inches in size, with the long axis vertical, located one above and one below the central opening, and separated from it about one-half inch. The shutter is placed immediately behind the front housing. Its radius is 10 inches. On its center is mounted the largest test object, a broken ring corresponding to the 6/60 figure of the Snellen series. About this figure numerous openings have been made, the two largest of which correspond in size, shape, and location to those of the housing. In addition, there are circular windows, arranged in groups of two, of identical size, so that one and one only will appear in position below and above at the same time. In all there are eight groups, graduated in size from those large enough to show the 6/30 rings down to those of just sufficient size to clear the 6/5 rings. This shutter is so arranged that all apertures can be closed at one setting, both above and below. The test-object dial lies behind the shutter and is one-half inch larger in radius than the latter. In the model shown it carries 8 sets of broken rings, arranged radially, 3 larger figures on every other radius, and 5 smaller on each of the intervening ones. The alternating arrangement was used in order to facilitate running the entire sequence from 6/30 down to 6/5 with the least amount of manipulation. The larger rings have been placed nearest the center, and the 6/5 figure, the smallest, toward the periphery. Thus, through the largest apertures three large test objects can be shown above and three similar ones below, or five of the smaller ones above and five below, coincidentally; or, by rotation of the

shutter, any two of similar size, one above and one below, of either group can be selected for special inspection. The front wall of the housing has been covered with black paper to reduce glare, and with the same object in view the exposed margins of the discs have been painted black. The figures are drawn in black India ink on a dull, mat white artist's drawing board. The entire instrument is constructed of similar material.

The second model (figs. 4, 5, 6, 7, and 8) was designed to meet, so far as possible, all the requirements for properly testing the refraction of the eye, including estimation of the amount and the axis of astigmatism. The underlying principle is similar to that of the first model. A second test-object disc, and a small dial, 2½ inches in diameter, have been added. The three larger are equal in size and are concentric. The smallest one is located in the mid-line above, with its axis 8½ inches from the center of the larger ones. This chart was designed for remote control, and, as a result, certain changes have become necessary. It proved impracticable to keep the 6/60 circle on the shutter, as the mechanism for occluding this figure, when so placed, introduced considerable additional complications. Instead, four rings of similar size were placed on the anterior test-object dial, a change in arrangement which broke the sequence from larger figures in the center to smaller at the periphery, and at the same time required transposition for better use of the available space. The larger ones are now located near the margin, the smaller toward the center. Not even with this arrangement does space allow location of the shutter windows and placing of the test objects in such a way as to show two figures simultaneously, as in the first model.

These changes have the disadvantage of not permitting rotation of the large ring on its own axis, and of not allowing at one reading a check on the errors arising from a preponderance of resolving power in any one meridian, which, if corresponding with that of the break in the ring exposed, might result in a higher reading than is justified. This last disadvantage can be met to some extent by placing two or more rings side by side for simultaneous exposure through one of the larger apertures, and does possess distinct superiority in that a smaller beam of light from the lantern may be used, thus reducing any possible glare resulting from the more disseminated illumination required by the first model. The third disc was originally designed to permit the use of other test objects in addition to the broken ring, according to the preference of the examiner. As now mounted, the letters of the standard metric charts have been supplied, beginning, however, with the 6/30 size. It would appear that better results could be obtained by using the broken ring on both dials, thus increasing the number and improving the arrangement of the rings, which is especially desirable with regard to the larger one, and allowing the use of the Maltese cross and other figures, as needed. This housing, therefore, contains only one window, which is somewhat triangular in shape, and curved above and below to correspond with the large and small circular openings in the shutter. Similar windows have been made in the latter, and in the first of the two figure dials. The former contains, in addition, nine round apertures, the largest of which is 3¾ inches in diameter, which is of sufficient size to permit exposure of the largest figures; the smallest aperture is large enough for the 6/5 figures. The third dial has one opening 3¾ inches in diamter, concentric with that of the same size in the shutter. By aligning these two windows and that of the second dial, a fourth window is brought into view, through which the small astigmatic chart can be seen. The three major discs and their respective separating diaphragms are placed in what might be called an anterior housing, the front and back of which have been constructed of one-eighth inch Celotex board to insure strength and lightness. A third Celotex board has been affixed behind those of the anterior housing, and carries the axle on which the fourth disc rotates. This disc is so constructed

that charts carrying rings of various sizes, with single or double breaks, may be mounted on it and rotated about their own axis. The fourth window referred to has been cut through the middle Celotex board, and around the periphery has been placed a scale, divided into 360 degrees, upon which the axis of astigmatism, when located, may be read off.

Distant control was secured by mounting the three large dials upon 9-inch aluminum discs, one-eighth inch thick, cut out to correspond with the various openings, and grooved about their margins to carry the linen lines used for rotation. The large radius of these permits as slow movement as is desired. Over them the lines have been run as endless belts. It has been found that they will operate with great ease when these lines, under slight tension, pass only three quarters of the way around the periphery, thus avoiding the crossing of any aperature by them. Such tension as is needed has been se-

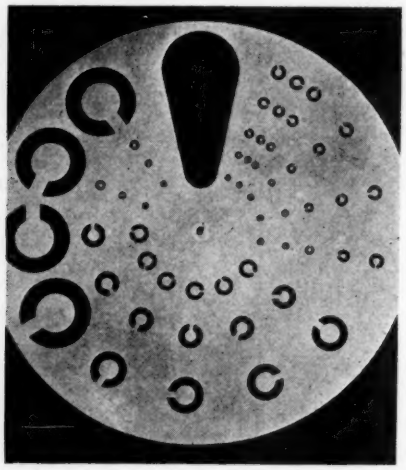

Fig. 4 (M. H. Post). Second model. A test-object dial.

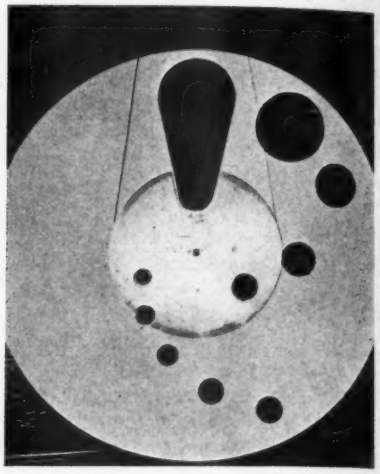

Fig. 5 (M. H. Post). Second model. Rear elevation of shutter dial, showing aluminum disc and arrangement of cord.

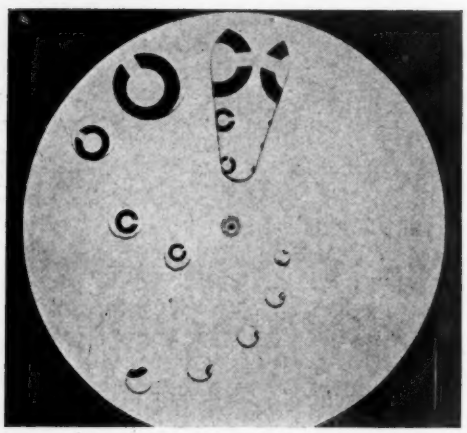

Fig. 6 (M. H. Post). Second model. Shutter dial in position over test-object dial.

Fig. 7 (M. H. Post). Second model. Showing appearance of 6/20 ring in position behind shutter and housing.

Fig. 8 (M. H. Post). Second model. Showing broken ring mounted for rotation on its own axis in opening through central housing. Around the window is seen the 360-degree scale.

cured by the use of small weights at the desk of the operator. The astigmatic dial alone is activated by a single cord wrapped about its 3-inch aluminum disc, counter-weighted at both ends. Ordinary agate guides, such as those used on the sportsman's fishing pole, have proved more satisfactory and less cumbersome than any other method of leading the controls from instrument to operator.

A little practice has proved sufficient to familiarize the examiner with the manipulation of these charts, although experience has shown that a few changes in the arrangement of the test objects will be helpful. Up to the present time, however, even with the graduated illumination to be described, neither the single nor the double broken ring has proved so satisfactory for preliminary location of the axis of astigmatism as was the familiar chart of Dr. Lancaster. For fine adjustment, however, the double broken rings have proved excellent, especially with the more intelligent class of patients.

No chart would be nearly complete without the proper lighting equipment. For the purposes of the first model, it has seemed sufficiently accurate to supply an ordinary desk lamp with a metal reflector. Each of these lamps is to be calibrated and a scale supplied with it, indicating the candle power of the globe to be used, its approximate life at full power, and the number of foot-candles developed at the chart when the lamp is placed so many feet away. For the more exacting needs of the second model a somewhat more elaborate although still very simple source of illumination has been constructed through the courtesy of Mr. J. L. Stevenson, of the A. S. Aloe Company. This lantern follows the usual type of all projectoscopes in that it is fitted with an iris diaphragm, two high-power lenses for focusing the light upon the mask, and two low-power lenses for focusing the light upon the chart. The number of foot-candles developed at the screen with the lamp as now constructed, when placed 15 feet away, may be varied from 1 to 16, rising to 50 at 10 feet. Owing to the fact that this lantern is not designed for the projection of images, it has not been found necessary to use acromatic lenses, thus greatly reducing the cost. Although the iris diaphragm remains the most expensive part of the lamp, it has not been deemed wise to supplant it by the much less costly diaphragm carrying a number of graduated stops. The importance that a sliding scale of illumination plays in the determination of visual acuity and of the amount and the axis of astigmatism is now common knowledge. Ferree and Rand go so far as to state that it is of even more value than, or at least of equal value to, the size of the test object. The same authors, writing in conjunction with E. W. Lewis,[7] have recently shown that the eyes of young and old are not alike in their response to similar amounts of illumination, and, furthermore, that the visual acuity of the two groups does not rise in equal ratio with the increase of illumination. They point out that on this account both groups should not be tested at the same number of foot-candles if one desires to arrive at a true value of visual function. Their figures suggest the desirability of having a range of from 1 to 60, an amount which we have thus far not been able to obtain, and which will probably always be modified in practice.

During the last few years a number of very satisfactory projectoscopes have been developed. In some of these both the size of the image and the amount of illumination can be varied at will. It is even possible to make allowance so as to accommodate the size of the image to the length of the range. It would appear that no form of apparatus could surpass these instruments when equipped with satisfactory charts, and probably the next few years will see their rapidly increasing use. In the more elaborate types the factor of cost is necessarily to be considered. Simple and somewhat less expensive types have been constructed, but not without the sacrifice of various desirable features. There is, in addition, a not inconsiderable prejudice against their use and a trend in favor

of some form of fixed and tangible figures. To meet these objections, the charts described seemed to be worth devising.

Conclusions

An attempt has been made to meet the need for better standardization of visual-acuity tests, both as to type of test charts and as to sources of illumination, at the same time maintaining a low cost.

The charts constructed for this purpose have been built on the principle of rotating dials carrying the test objects and surmounted by a rotating shutter the function of which is to expose the object or objects desired, while excluding all others.

The importance of the ability to select and isolate the object under study is emphasized.

The suitability of the broken ring of Landolt as a standard of visual acuity is demonstrated as is also the use of a more complex figure, such as the Maltese cross of Beach, for accurately testing refraction.

The value of the double broken ring of Landolt, as modified by Ferree and Rand, for analysis of astigmatism is pointed out.

Finally, attention is called to the great importance of a variable standardized illumination for all visual-acuity tests, and simple lamps for securing such lighting are described.

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OBSERVATIONS ON THE EPITHELIAL-CELL INCLUSIONS OF EARLY UNCOMPLICATED TRACHOMA

IDA A. BENGTSON, PH.D., AND L. S. ROLUFS, B.S.
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Observations on the epithelial-cell inclusions of trachoma based on a study of 13 cases of short duration, some as short as two weeks, are reported. The study affords evidence that lends support to the view previously expressed by the senior author that the organism from which the inclusion body originates is rod-shaped in its typical form. It is suggested that the elementary bodies may be likened to spores in the sense that they represent a form of the organism that is resistant to the lytic and inhibitory substances present in the cytoplasm of the cell. They apparently arise in response to conditions in the cell that are unfavorable to the continued growth in the rod form. The matrix or "mantle" of the inclusion body probably represents the partially disintegrated rod forms of the organism. From the United States Public Health Service, National Institute of Health.

Further efforts to obtain information regarding the etiology of trachoma were continued during the summer months of 1935, at the Trachoma Station in Rolla, Missouri. As formerly, the investigation included microscopical and cultural studies. The cultural studies were concerned with attempts to cultivate the causative agent in the chorio-allantoic membrane of the chick embryo. The results obtained in using this method were not conclusive and will require further study. The microscopic studies, on the other hand, yielded interesting information. A rather unusual group of early cases was available for study and film preparations from some of these were particularly revealing of the nature of the inclusion body. Apparently there had been a recrudescence of trachoma in certain parts of the state, judging from the clinical appearance and the history of the cases coming into the hospital. Thirteen cases, seven of which were of two- to six-weeks' duration are included in this study. The diagnosis of trachoma was established by Surgeon C. E. Rice and Acting Assistant Surgeon J. E. Smith of the United States Public Health Service.

Interest in the inclusion body of trachoma has been renewed following recent studies of bodies of a similar nature found to occur in inclusion blenorrhea and also in psittacosis, vaccinia, fowl pox, and other diseases. Two versions of the inclusion body have been presented in the recent literature, that of Thygeson[1] in this country, and of Stewart[2] of the Giza Memorial Ophthalmic Laboratory in Cairo, Egypt. Stewart states "The Prowazek-Halberstaedter body is a phagocytic vacuole in an epithelial cell. It may contain any micro-organism which is present in the conjunctiva, either bacterial or granular." He states further that in Egyptian trachoma the Prowazek-Halberstaedter bodies appear only with secondary infection, and that in uncomplicated Egyptian trachoma these bodies are absent in all stages. He considers as unproved the theory that a granular virus may be concerned. Thygeson, on the other hand, has adopted the view that the inclusion body in trachoma is of significance and that it is evidence of a filterable virus, thus returning the question of the etiological factor of trachoma to that held a number of years ago before the isolation of *Bacterium granulosis* by Noguchi. He with Proctor and Richards[3] has moreover recently succeeded in producing clinical trachoma in a human subject by the inoculation of the filtrate of material from both eyes of 10 trachoma cases.

The type of trachoma occurring in Missouri

Trachoma occurring in the Ozark region of Missouri is apparently a very pure type. Secondary infections are infrequent; thus in the 13 cases studied in 1935, there were no secondary infections, as was shown by culturing conjunctival material on 10-percent horse-blood agar. Throughout the previous studies which have been made in Missouri, the infrequency of secondary infection has been a striking

observation.[4, 5] In contrast, the trachoma of southern Georgia, studied by the senior author in 1930-1932, was usually complicated by acute conjunctivitis, which is very prevalent in that section of the country. Using the same culture media in the study of the Georgia cases as was used in the Missouri cases, hemoglobinophilic organisms of the Koch-Weeks and Morax-Axenfeld types were demonstrated in large numbers. These organisms are of such rare occurrence in the Missouri type of trachoma as to be almost negligible.

Inclusion bodies in Missouri trachoma

In the 13 trachoma cases studied in 1935, inclusion bodies were present in 8, a percentage of 62. The majority of these cases were of recent origin. Of the 230 cases reported in 1928, inclusion bodies were found in 45 percent. In this series both recent and old cases were included and usually preparations for microscopic studies had been taken only once.

Significance of the inclusion body

With the continued microscopic study of pure trachoma one cannot fail to be impressed by the presence of the inclusion bodies. They are the one characteristic microscopic feature of the disease. Definite organisms are rarely seen. Even staphylococci and *C. xerosis* are seldom seen, although a few colonies of these organisms usually appear on culture. While it is true that inclusion bodies are not found in all cases, nevertheless they do occur in a relatively high percentage of patients, particularly in the early stages of the disease. No doubt repeated preparations from many eyes which do not show them at first would yield a higher percentage of positive results. Although in some instances they are few in number, occasionally preparations are seen in which they are very numerous and in such cases their significance seems almost certain. The presence of inclusion bodies in Missouri trachoma and the absence of secondary infection, therefore, affords evidence that the inclusion bodies are concerned in the disease and that they do not originate as the result of secondary infection. This is contradictory to the views expressed by Stewart and supports those of Thygeson.

The appearance of the inclusion body as described in the literature

The inclusion bodies of trachoma were first observed by Halberstaedter and von Prowazek[6] in 1907. They are described as blue irregular masses, when stained with Giemsa, occurring in the cytoplasm of the epithelial cell. They increase in size and often occur in the form of a cap over the nucleus but may fill the whole cytoplasm of the cell. The center of the mass becomes less dense, and minute granules, staining reddish, appear in the blue-stained mass. The small granular bodies were considered by von Prowazek and Halberstaedter as primitive forms of the parasitic organism, while the bluish mass was considered as a reaction product on the part of the cell and was designated as the "mantle," the parasite therefore being designated as *Chlamydozoon*.

Lindner,[7] in 1909, reported that the early stage of the inclusion body consisted of blue-stained coccoid masses, which he designated as "initial bodies." These he considered to represent the typical appearance of the organism, the small reddish coccoid bodies the degenerated forms. "Free initial bodies" were also found outside the epithelial cells. There was considerable variation in the morphology of these bodies and he described ring forms, diplococcuslike forms, short rod forms, biscuit forms, and sickle forms. He stated that multiplication took place by elongation and a process of division following constriction at a given point.[8]

The present senior author reported microscopic observations, in 1928 and 1929, which afford evidence that the inclusion originates from a rod-shaped microörganism. Three of the photographs published at that time are reproduced (figs. 1-3). The inclusion body in figure 1 consists of forms which are undeniably rod-shaped microörganisms. In figure 2, the organisms are crowded

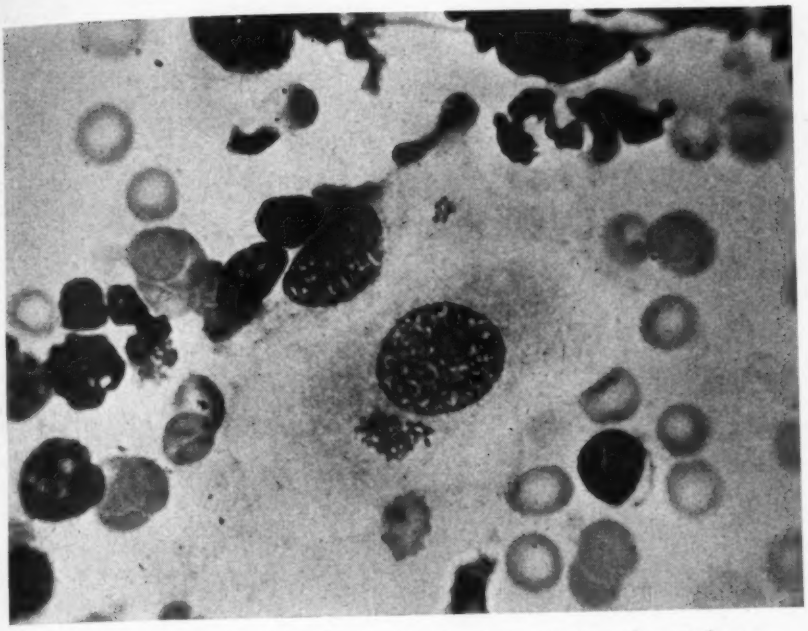

Fig. 1 (Bengtson). Inclusion body showing rod-shaped organisms.

Fig. 2 (Bengtson). Inclusion body showing rod-shaped organisms.

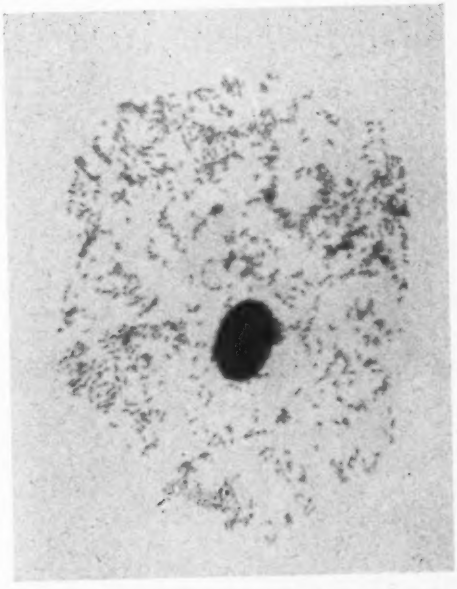

Fig. 3 (Bengtson). Inclusion body dispersed after being treated with 1-percent acetic acid.

closely together, but nevertheless the rod structure may be discerned. In figure 3, the organisms forming the inclusion body have been dispersed by the action of 1-percent acetic acid and the rods are plainly visible.

Microscopic observations in 1935

The 13 cases considered in this study were in patients who showed marked conjunctival activity, admitted to the Trachoma Hospital in Rolla during the three summer months, June to August.

Table 1

TRACHOMA CASES STUDIED

Case and Number	Age	History of Exposure	Duration	Eye Involvement	Preauricular Lymph Nodes	Blood Agar Culture	Microscopic Findings
1. Mrs. R.	39	Husband (?)	1 year	Both, papillary	Not palpable	No growth	No P.-H. inclusions seen, a few I.B., some E.B.*
2. Mr. V.	53	Unknown	6 weeks	Both, follicular, papillary	Not palpable	Only *C. xerosis*	Two P.-H. inclusions seen, I.B. type, very dense, no free I.B., few E.B.
3. G. C.	10	Mother	Not known	Both, follicular	Not palpable	R.E. 2 Staph., 2 *C. xerosis*, L.E. 4 Staph.	No P.-H. inclusions nor E.B. seen, many definite free I.B., mostly bipolar
4. L. C.	8	Mother	2 years	Both, follicular	Not palpable	R.E. not operated on L.E. 3 Staph., 3 *C. xerosis*	No P.-H. inclusions nor E.B. seen, many definite free I.B., mostly bipolar
5. L. W.	17	Not known	5 years	R.E. only, very florid, papillary and follicular	Enlarged on right side	R.E. 1 Staph., 7 *C. xerosis*	No P.-H. inclusions nor I.B. seen, some E.B.
6. L. H.	8	Father	Not known	Both, follicular	Not palpable	R.E. no growth L.E. 2 Staph.	No P.-H. inclusions nor I.B. seen, some E.B.
7. J. D.	8	Unknown	Not known	Both, very follicular	Both palpable	R.E. 2 Staph. L.E. 4 *C. xerosis*	Numerous P.-H. inclusions, many extracellular I.B., some E.B.
8. G. M.	19	Father	2 weeks	R.E. only, papillary, acute onset	Enlarged and tender left side	R.E. 8 *C. xerosis*	Two P.-H. inclusions seen, no I.B., some E.B.
9. H. K.	48	Family history	6 weeks in L.E., 5 weeks in R.E.	Both, papillary and follicular	Not palpable	Pure cult. Staph.	P.-H. inclusions moderately numerous, no definite I.B. nor E.B. seen
10. B. H.	9	Brother (?)	3 weeks	R.E. only, papillary, spread to left while in hospital	Enlarged on right side		Many P.-H. inclusions, many I.B. type, showing separate granules, some free I.B., E.B. very numerous
11. B. L.	7	Mother and father	4 weeks	Both, papillary	Markedly enlarged both sides		Very numerous P.-H. inclusions, E.B. exceedingly numerous (500 per field), some definite free I.B., both eyes
12. Mrs. E.	56	Unknown	2 or 3 weeks	Both, papillary, very active case	Enlarged and tender both sides	3 *C. xerosis* 2 Staph.	Numerous P.-H. inclusions, mostly very dense, no definite I.B., some elementary bodies
13. S. A.	21	Unknown	6 weeks	Both	Both sides much enlarged		Many P.-H. inclusions, some I.B. and E.B. present

* P.-H. Prowazek-Halberstaedter inclusion bodies.
I.B. Initial bodies.
E.B. Elementary bodies.

Slides were prepared from the conjunctival scrapings, fixed in methyl alcohol, and stained in dilute Giemsa solution for 24 to 48 hours. Then, as recommended by Thygeson, the preparations were slightly decolorized in 95-percent alcohol, which removes the stain from the nonspecific granules without affecting the color of the elementary or initial bodies.

As will be seen from the accompanying table, eight of the 13 patients, or 61.5 percent had demonstrable Prowazek-Halberstaedter inclusion bodies. Seven of these patients gave a history of less than two months' duration of the disease and epithelial inclusions were found in all of them. As additional evidence of the acuity of the condition, five of these seven had palpable preauricular lymph nodes (Rice and Smith[9]). The number of inclusion bodies varied from a very few (cases 2 and 8) to extremely numerous (cases 7, 10, 11, and 12).

"Initial bodies" were found in seven of the cases, being particularly numerous in cases 3, 4, and 7. They occurred as small, bipolarly stained cocco-bacillary or oval bodies and were very abundant extracellularly in cases 3 and 4, although no cellular inclusions were found in these cases. The peculiar forms described by Lindner, including the ring forms, biscuit forms, and sickle forms, were not observed. Throughout the trachoma study the senior author has only very rarely seen forms which might suggest some of these. The elongated forms (small rods) and diplococcoid forms of Lindner have been seen, but the extracellular form which has been seen most frequently and which seems most typical has been the oval or elongated bipolarly stained form. This form when seen extracellularly is definite but is, as a rule, less conspicuous than the elementary bodies, as it is usually more faintly stained. There seems to be a gradation downward in size, so that it is often difficult to decide whether certain extracellular diplococcoid forms should be considered "initial bodies" or "elementary bodies."

Rod-shaped small microörganisms occurring both extracellularly and intracellularly have been observed in the present study as they were in the previous one. Lindner has included this form among the various types of "initial body" which he describes, the "längliche Gebilde (Stäbchenformen)." In case 11 of our group, numerous small rod forms occurred outside the cells (fig. 4) and some also within the cells, in preparations which had been stained with Giemsa for 48 hours. The organisms occurred singly or in pairs and sometimes had the appearance of being frayed or partially digested at the ends. These rods were no larger than the Rickettsiae of Rocky Mountain spotted fever and endemic typhus fever studied by the senior author.[10] In one instance several of these small rods were seen at the margin of an isolated epithelial cell and contained in the cytoplasm of the cell were several indefinitely outlined small rods and a diplobacilluslike form with pointed ends which had the appearance of being swollen and less dense (fig. 5*) than the extracellular organisms. In case 12 also, similar extracellular and intracellular organisms were seen. Forms suggestive of rod-shaped structures were observed in the cytoplasm of the epithelial cells in several other cases. These bodies were not sharply outlined but suggested the appearance of being swollen and in the process of lysis.

The "elementary bodies" occurring embedded in the bluish-staining matrix are very definite. Deeply stained, as a rule, they appear as reddish or violet coccoid bodies against a bluish background which may be more or less amorphous in appearance. They are usually quite uniform in size, particularly in the later stages, and also in their mode of staining. They are decidedly more dense than the bluish matrix which appears to become more attenuated as the "elementary bodies" become more conspicuous. These bodies occurring intracellularly and

* In the photograph the extracellular rods appear lighter than the intracellular rods, owing to the fact that certain color filters were used to emphasize the intracellular rods.

* P.-H. Prowazek-Halberstaedter inclusion bodies.
I.B. Initial bodies.
E.B. Elementary bodies.

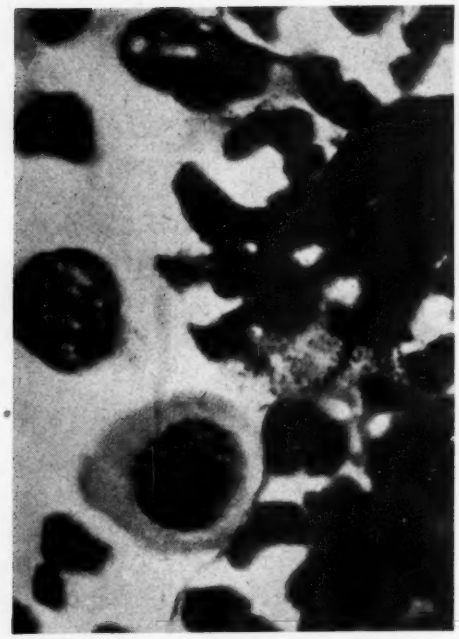

Fig. 4 (Bengtson and Rolufs). Rod-shaped organisms outside cells.

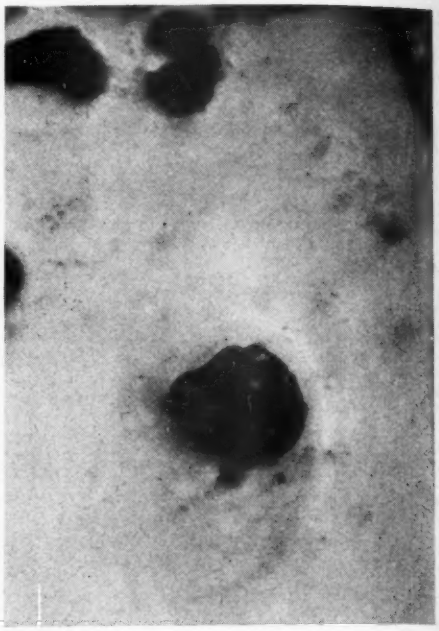

Fig. 5 (Bengtson and Rolufs). Rods at margin of cell and rods within cell undergoing partial lysis.

Fig. 6 (Bengtson and Rolufs). Inclusion body suggesting rod-structure.

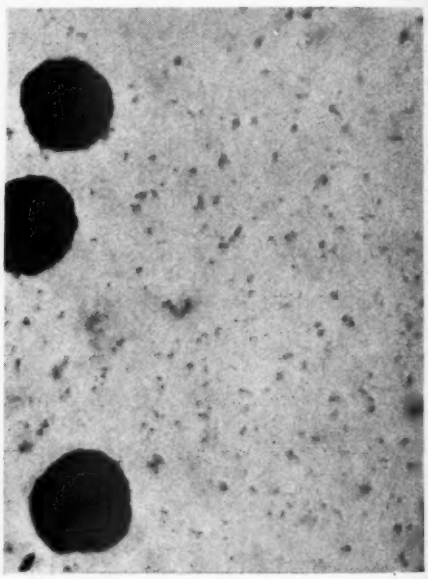

Fig. 7 (Bengston and Rolufs). Free elementary bodies and one initial body.

extracellularly were seen in eight of the 13 cases. In some instances, particularly in cases 10 and 11, the extracellular forms were more numerous than usual and in case 11 they were so exceedingly numerous as to make this an outstanding case. They were seen in practically every field and in some

fields numbered several hundred; occasionally there were as many as 500 (fig. 7). A view of such a preparation affords rather convincing evidence that these bodies are concerned in the disease.

Interpretation of the inclusion bodies, the "elementary bodies," the "Initial bodies" and the rod-shaped organism

In interpreting the inclusion body, the organism as well as its environment must be considered. The organism may be one which has inherent pleomorphic properties, the manifestations of which may be influenced by a number of factors. It seems quite probable, as was pointed out in a previous publication,[4] that one of these factors is the presence on the conjunctiva and in the secretions of the eye of certain lytic protective substances which include the lysozyme of Fleming.[11] Fleming demonstrated the high lysozyme content of the tears in comparison with that of other secretions and tissues of the body. That such protective substances are present is evident from the fact that bacteria on the normal conjunctiva are very few in comparison with the enormous numbers present on the mucous membranes of certain other parts of the body. In certain acute conjunctival conditions also, although the invading organisms may be very numerous at the height of the disease, they become very rare in a short time.

It seems probable therefore that the lytic substances which are present on the surface of the conjunctiva and also in the epithelial cells have a tendency to destroy or to modify the appearance of the organism concerned in trachoma, thus giving rise to the variety of forms seen.

The inclusion body may be explained as the development of the rod-shaped organism in the cytoplasm of the epithelial cell. It does not retain its sharply outlined appearance long, owing to the tendency of the lytic substances in the cytoplasm of the cell to combat the growth of the organism. When there are only a few organisms intracellularly, the lytic action seems to be manifest at first by a swelling of the organism and a decrease in the density. The tendency to swell probably accounts for the coccoidal appearance of some of the organisms (fig. 8). The coccoidal appearance of the "initial bodies" is stressed by Lindner. After the organisms multiply, they become more closely packed together and do not appear larger but rather smaller than normal.

The partially disintegrated or digested organisms probably account for the more or less structureless appearance of the inclusion body. In spite of the lytic tendency of the cell, the organism seems to adapt itself to the conditions of its environment and continues to multiply until a large part or the whole of the cytoplasm may be occupied by the inclusion body. It appears that when a certain stage is reached, the growth as the rodlike form ceases and there suddenly appear the small dense, sharply outlined reddish-staining coccoid bodies embedded in the blue matrix. It is suggested that these bodies may be sporelike in nature, in the sense that they represent the portion of the organism which is resistant to the lytic substances of the cell. It may be that they appear in the same way as do the spores of ordinary bacteria, that is through the exhaustion of the food supply or when for other reasons the conditions may be unfavorable for growth in the usual form. The fact that these small bodies stain differently and that they appear more dense is evidence in favor of the view that they differ in composition or structurally from the rod form. Their uniform size and shape indicate that they are definitely formed bodies and not simply fragments of the "initial-body" form. They may be no more numerous than the rod form, as indicated by figure 3. The diplo-forms of the "elementary bodies" may be explained as originating from diplobacillary forms.

Whether the inclusion body originates from the "elementary body" or from the rod form penetrating the cytoplasm of the cell it would be difficult to determine. In any case the organism after its entrance into the cell develops as the rod form or Lindner's "initial-body" form. The "life cycle" of the or-

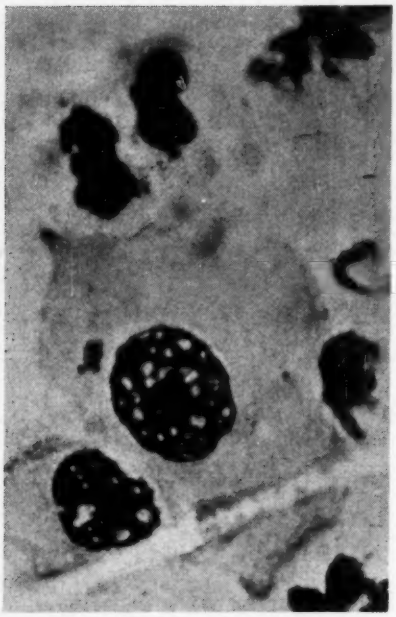

Fig. 8

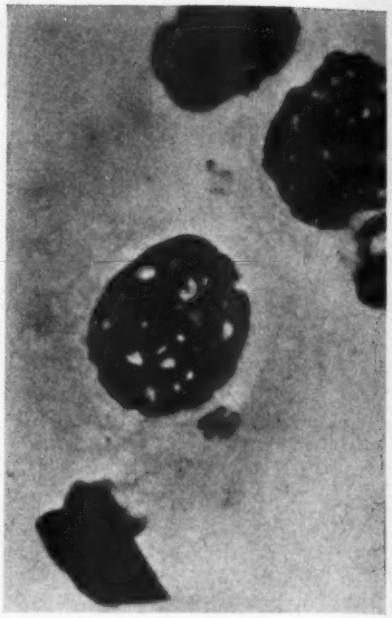

Fig. 9

Figs. 8-9 (Bengtson and Rolufs). Early stage of inclusion bodies, showing swelling of organisms.

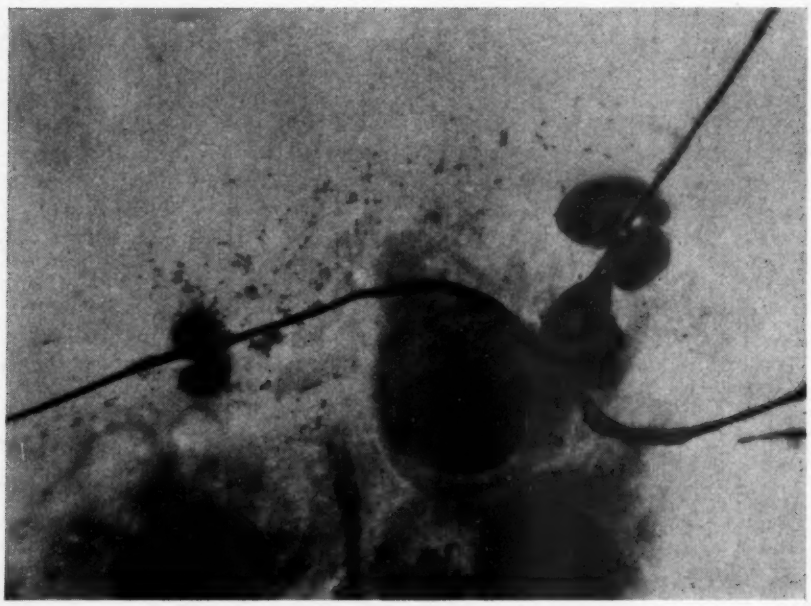

Fig. 10 (Bengtson). Free elementary bodies.
Magnification approximately × 1000. Giemsa stain.

ganism probably resembles that of bacteria which are sporebearing, in that the organism passes from a less resistant to a more resistant form. In addition, extracellular pleomorphic forms, including the bipolarly stained and other forms described by Lindner, probably arise as the result of the action of the lytic substances normally present in the eye. The blue-staining matrix in which the "elementary bodies" are embedded probably represents the remnants of the rod or "initial-body" form.* The inference seems warranted that the "elementary body" which is the part of the organism that is resistant to the lytic action of the cell, serves to keep alive the infection and explains the marked chronicity of the disease.

As to the nature of the organism, it may belong to the group which requires living tissue for growth, although this has not been demonstrated. Morphologically, *Bacterium granulosis*, an unusually small rod-shaped organism, would not necessarily be excluded as the incitant of the inclusion body. The almost complete failure of the senior author as well as of many others to isolate this bacterium casts doubt on its etiological role in trachoma. It may be pointed out, however, that action of the lytic substances of the conjunctiva on the organism concerned may affect not only its morphology but also its growth properties, so that it would be difficult to cultivate under the usual conditions.

The organism of trachoma has been likened morphologically to the Rickettsiae by Thygeson. Studies by the senior author of the Rickettsiae of Rocky Mountain spotted fever and endemic typhus fever[10] indicate that the rod-shaped organism may be compared with the Rickettsiae of the two diseases mentioned, but probably not the "elementary-body" stage.* Though the cytoplasm of the cell in Rocky Mountain spotted fever and typhus may be packed with Rickettsiae, they retain their rod form and appear as such outside the cells.

* The findings of Rice[12] regarding the carbohydrate nature of the matrix of the inclusion body are not inconsistent with the above interpretation of the inclusion body. That certain carbohydrates including glycogen are chemical constituents of certain bacterial cells is a well-known fact.

Summary

Further studies on the inclusion body of trachoma occurring in recent and uncomplicated cases confirm the view that the inclusion body is concerned as the etiological agent of the disease. As stated in a previous publication, the inclusion body probably originates from a rod-shaped microörganism.

The rod-shaped form is probably the typical form of the organism and, under the conditions of the environment to which it is subjected in the cytoplasm of the epithelial cell, it passes through a resistant phase, the "elementary-body" stage. The blue-staining matrix or "mantle" of the inclusion body probably represents the remnants of the rod form.

The "initial bodies" of Lindner probably represent the rod form of the organism as affected by the lytic substances of the conjunctiva and of the epithelial cells.

The organism resembles the Rickettsiae morphologically at one stage and possibly also in its growth requirements. Failure of many workers to isolate *Bacterium granulosis* indicates the possibility that the organism concerned may be one which, like the Rickettsiae and the filterable viruses, requires living tissue for growth although this is not certain.

* Compare figures 3 and 4 with 7 and 10.

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THE USE OF VARIABLE ILLUMINATION IN THE CORRECTION OF THE PRESBYOPIC EYE

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There are two ways of aiding the presbyopic eye to see its object at the desired near distance; namely, a correcting glass and intensity of light. The former of these is the major and the latter a minor or auxiliary aid. However, the proper selection of either cannot be made without reference to the other. In this connection it may be said that so far as the correcting glass is concerned, the strength of glass required sustains, within comparatively narrow but significant limits, an inverse relation to the intensity of light used. The preferred procedure is the selection of the optimum combination of intensity of light and strength of glass.

In July, 1934, we published the description of an instrument that provides a convenient means for varying the intensity of illumination over a wide range, from zero to very high, without change in the color of light or in the size, shape, and location of the illuminated field.[1] This instrument was not devised for the purpose of selling light, but to aid the practitioner in the examination and care of the eye. The use of variable illumination for the correction of myopic, hyperopic, and astigmatic eyes and its effect on the determination of the near point of vision have already been discussed in print.[2] It is our purpose here to point out its use in the selection of the proper strength of glass for near work for the presbyopic eye.

In any series of tests for the prescribing of intensity of light, it will be found that the major need for individual testing is in the case of the adolescent, the sick and defective, and of the presbyopic and near-presbyopic eye. There is much less need for the individual testing of normal eyes between the ages of 20 and 35 years. We have found that the greater number of these prefer a medium intensity of light over a comparatively small range. In the case of the presbyopic eye the greatest benefit from the test may be obtained by eyes in the early and middle stages of presbyopia.

There are two ways of aiding the presbyopic eye to see its object at the desired near distance; namely, a correcting glass and intensity of light. The former of these is the major and the latter a minor or auxiliary aid. However, the proper selection of either cannot be made without reference to the other. The preferred procedure is the selection of the optimum combination of intensity of light and strength of glass.

So far as the correcting glass is concerned, it may be said that the strength of glass required at a given near distance sustains, within comparatively narrow but significant limits, an inverse relation to the intensity of light used. At high intensities of illumination the work could be discriminated with a weaker glass than at medium and lower intensities. This is due for the greater part, if not entirely, to the effect of the higher intensities of light on visual acuity and the visibility of the object.[3] There are the following objections to the use of high intensities in selecting the correcting glass: (1) If a glass were selected at a high intensity, it would have to be used at high intensities. Prolonged use at these intensities is apt to

cause discomfort because of glare from the page or other work. So selected, the glasses prescribed would be unsatisfactory for work at medium and low intensities. (2) High intensities are expensive, and difficult to obtain with adequate protection from glare from the source of light. (3) The glasses would have to be used in all sorts of locations and situations. High intensities are not to be found in all sorts of locations and situations, and never will be.

With decrease of intensity less effect of the change is obtained—little, in fact, until very low illuminations are reached. At these illuminations the tendency is to choose a stronger glass in order to secure a benefit from magnification. This glass, however, would not, in most cases, be satisfactory at medium and high intensities unless the distance of the work were changed, and probably not even then because of the greater amount of convergence required, the less favorable relation between accommodation and convergence, and the undue limitation of the range of distance over which the object can be discriminated. At these intensities the additional magnification is not needed for the comfortable discrimination of the object.

Obviously, then, the practical procedure requires that in general the glass be prescribed of a strength that is most satisfactory for the range of intensities that prevails at any given time in the current practice of lighting—due exception being made for cases in which the glasses are to be used only or primarily at other intensities of illumination. Assuming that this range is now from 5 to 20 foot-candles, that glass should be selected which is the most satisfactory throughout this range, the test being made at 5, 10, 15 and 20 foot-candles or at other suitable intervals.

Our experience leads us to believe that in the greater number of cases, a glass which is satisfactory for this range will also be reasonably satisfactory in case higher intensities of light are preferred because of some condition of the sensorium or for other reasons. If not, the problem in such cases is to find the best combination of strength of glass and intensity of light. With a convenient means of varying the intensity of illumination, this should not be difficult to do. The ability to control at will the important factor of intensity of light gives a certainty and finish to the test that is very gratifying to a careful worker and that is unobtainable from a variation in the strength of the glass alone. We very strongly recommend that a variable illuminator should be added to the trial case as part of the standard equipment of the refractionist.

Although we do not consider it worth while to give the test data for any considerable number of cases, we do, however, feel justified in citing one case that seems to be typical, as illustrative of what has been said above. Mr. A. G., aged 56 years, by occupation an instrument maker, preferred for reading at 30 ft-c, +1.37 D.sph. for the right eye and +1.25 D.sph. for the left eye, in addition to his correction for distance; at 10 to 20 ft-c, +1.50 D.sph. for the right eye, and +1.37 D.sph. for the left eye; at 5 ft-c, +1.62 D.sph. for both eyes; at 3 ft-c, +1.87 D.sph. for both eyes; and at 1.5 ft-c, +2.12 D.sph. for both eyes. His preferred intensity of illumination for reading was 11 to 12 ft-c; his toleration for intensity for comfortable reading ranged from 5 to 16 ft-c. His preferred combination of strength of glass and intensity for reading was, then, +1.50 D.sph. right eye, +1.37 D.sph. left eye, and 11 to 12 ft-c of illumination. This combination had all the desired requirements for reading; namely, the intensity of light preferred, a strength of glass that was entirely comfortable, and a range of distance at which the object could be seen greater than with any other combination that was comfortable. The favorable range of distance here was due both to lesser strength of glass and to the very satisfactory visibility given by the comparatively high intensity of light. The combination of +1.37 D.sph. right eye, and +1.25 D.sph. left eye, and 30 ft-c of illumination, was not preferred because this intensity was glaring and higher than his limit of toleration for comfortable reading. The glass chosen for this illumination was too weak for intensi-

ties of 20 ft-c and below. On the other hand, the glass chosen for 1.5 ft-c was too strong to be comfortable at 3 or more ft-c. This glass was chosen only because a benefit of magnification was needed to overcome the low visibility due to the small amount of light. The glasses chosen for 3 and 5 ft-c were, however, comfortable at higher intensities up to his upper limit of toleration for intensity of light for reading, but were not preferred at these illuminations because they were stronger than was needed and, therefore, limited unduly the range of distance over which the object could be comfortably discriminated. While he had facilities in his own shop for 10 ft-c and more, his work was on dark material and often required him to go from room to room to examine and repair apparatus where that amount of illumination was not provided. In such a case, we would not feel justified in prescribing the glasses that were preferred at higher than 3, or at most 5 ft-c. We would again especially caution against the use of a higher intensity of illumination when making the presbyopic correction than the range at which the glasses are apt to be used. The tendency in such a case will be very strong to prescribe too weak a glass.

This discussion, it will be understood, has no bearing on any ideal or just desire to raise the level of intensity in lighting practice. While intensity of light has an effect on the strength of glass that is chosen, strength of glass seems to have no material effect on the upper limit of the range of preferred intensities of light unless the glasses are so weak as to require an intensity above the glare threshold for the sake of adequate visibility. With the proper selection of glasses, this upper limit is determined or fixed by the lower limit or threshold of glare on the work. Moreover, any considerable raising of the level of intensity in general lighting practice will come only with great labor and great patience of endeavor. The prescribing of glasses cannot wait for the desired progress in that direction. We are dealing here with a practical situation in the present. When such progress comes, it can be taken into account in the test procedure.

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PHOTOGRAPHY OF THE EYE FOR CASE-RECORD PURPOSES

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Photography offers a means of providing an accurate impression of ocular disease that written description cannot be trusted to convey. Special, expensive apparatus is not required. The author demonstrates his procedure as simple and available to every ophthalmologist. Delivered as an illustrated lecture for the class of the thirteenth Summer Graduate Course in Ophthalmology and Otolaryngology at Denver, Colorado, on July 15, 1935.

Numerous excellent drawings and illustrations for case records have been made in years gone by, and are still being made. The drawings have been for the most part in black and white. Other drawings have been in colors and lithographed, as may be seen in Haab's "Atlas of external diseases of the eye." Excellent drawings of the fundus were made in color by Mr. A. W. Head for various writers on fundus conditions. These have since come into the possession of Hamblin and Company of London, England. Margaretta Washington, late of Philadelphia, made a great number of excellent colored drawings for Dr. de Schweinitz and others, illustrative of fundus diseases. Recent publications include an atlas of external diseases of the eye by Humphrey Neame,[1] and pictures of the fundus oculi by Dr. Wilmer[2] of the Wilmer Institute, Baltimore.

An ophthalmologist with a talent for drawing should use it to make drawings for his records; in so doing he becomes more observant and secures a more lasting mental impression of the details of the condition.

The development of photography has occurred within a little over a century. Nicéphore Niepce, a Frenchman, produced the first permanent photograph in 1827. In 1839, Louis Daguerre perfected the daguerreotype, and in 1871, the present gelatin-film process was first used. Rapid strides have been made in the development and perfection of photography. One recent advance has been telephotography; and television is said to be ready for practical use.

Photographs of the exterior and interior of the eye for records and study have been made for a number of years. Dr. Arthur J. Bedell has furnished us with a wonderful collection of pictures of the fundus in flat, and in stereo for binocular vision. In the June, 1935, number of the Archives of Ophthalmology is an illustrated article by Dr. Wm. A. Mann, Jr.,[3] on infrared photography —a method by which a photograph of the iris can be taken through an opaque cornea.

The taking of photographs is fascinating work, easily and quickly performed. Every ophthalmologist encounters from time to time a patient whose eye or eyes are so markedly abnormal, from disease or tumor, that a written description fails amply to picture all the interesting features. The photographic print imparts very quickly definite and exact information through the eyes of the observer to his brain. A word picture, by oral or written description, requires considerable time; there is, moreover, an element of uncertainty as to the understanding of the true appearance that will be derived from the description; and too frequently only a transient impression is made on the mind and memory. No two persons will mentally see the word picture alike, but a photograph is the same to all observers, although not all may interpret it fully or correctly from lack of knowledge. Briefly, as Dr. Pierce of Baltimore has written, "the photograph gives a more comprehensive and definite idea" than a word picture.

Two recent articles have appeared in the American Journal of Ophthalmology on photographing the eye with the miniature camera. One by H. F. Pierce, Ph.D., (1934, v. 17, p. 527) and the other by Ramon Castroviejo, M.D., (1935, v. 18, p. 353). Both authors give a clear description of their methods and and illustrate the instruments and equipment. The camera they use, a

Leica, takes excellent pictures, 16 x 32 millimeters, that require enlargement to be of value in records.

Good pictures can be made by anyone with the use of a roll film, cut film, film pack, or plate camera. An expensive camera is not essential for the making of good pictures, but it is very desirable to have a good lens accurately adjusted. In taking pictures, a knowledge of three major points is important. They are: the light, time of exposure, and exact focus. The light may be indoor daylight near a window, or artificial light such as is furnished by a daylight lamp of 200 or 300 watts, a mazda or photoflood lamp. The time required varies with the brilliancy and proximity of the light, and the opening of the shutter. Ordinarily one or two seconds of time in bright indoor daylight, with the shutter at F/11 will be ample. A shielded daylight lamp of 300 watts will give good results, and is dependable. A photoflood lamp is ample for a picture at one foot in 1/25 of a second. An adjustable nine-inch aluminum reflector with clamping attachment for a photoflood lamp of 750 watts costs about two dollars. Daylight is better than artificial light for photographing the eyes of children, as they are restless under artificial light. The Western Exposure Meter used as a guide will indicate the exact time required under all circumstances. By adding a supplementary lens in a portrait attachment, in front of the regular lens in the camera, pictures may be obtained in size near or above the normal, according to the extension of the bellows and the strength of the supplementary lens.

To gain the knowledge of how to use the camera for close-up work, draw out the bellows of the camera for a six-foot focus as indicated on the scale plate, then add a +6 D. lens in a portrait attachment in front of the regular lens, fasten a plate of ground glass to the back of the camera where the film would rest, set the camera in front of an illuminated, inverted small type-card, and it will be found that the distance from the plane of the supplementary lens to the type-card is about six inches. This adjustment is suitable for taking the picture of a single eye. A +4 D. lens instead of the +6 D. is the correct strength for photographing both eyes at about eight-and-one-half inches from the supplementary lens. A +2 D. lens is the strength to use for photographing the entire face at 15 inches. The exact focal distance for each lens is learned by making tests with the individual camera used, for the focal length of the original lens is not the same in all cameras, the so-called fast lens having a shorter focus than the slower ones. If the camera has a double extension bellows, the use of the +6 D. lens will give a picture from three fourths to 2 ½ times the normal size according to the extension used. With the extension there is a ratio of increase in the time required for taking the picture. The amount of light diminishes with the square of the distance. With the securing of the exact focal distance of the camera for the various supplementary lenses, the further use of the ground-glass plate may generally be omitted, for pictures taken according to the findings are sure to be sharply focussed. The same rule applies to the making of copies of other pictures.

Recently the Eastman Kodak Company has placed on the market a Brownie Kodak No. 6-16, taking a 2½ x 4¼ inch picture, at a price of $3.75. It is a box camera without bellows. A +7 D. lens added in a portrait attachment (costing seventy-five cents) will give a picture two thirds the normal size at a six-inch focus, or with a +3 D. lens a picture of the head at a fifteen-inch focus, the kodak being set for a 10-foot focus.

In taking a picture of the eye, the camera is set on a level with the eye, so that a vertical and a horizontal line through the camera will cross opposite the center of the cornea. The camera is then pushed forward or backward, stopping when the distance—by a measuring rule—from the supplementary lens to the object is exactly correct, according to the strength of the supplementary lens in use. An assistant is usually needed to hold the eyelids

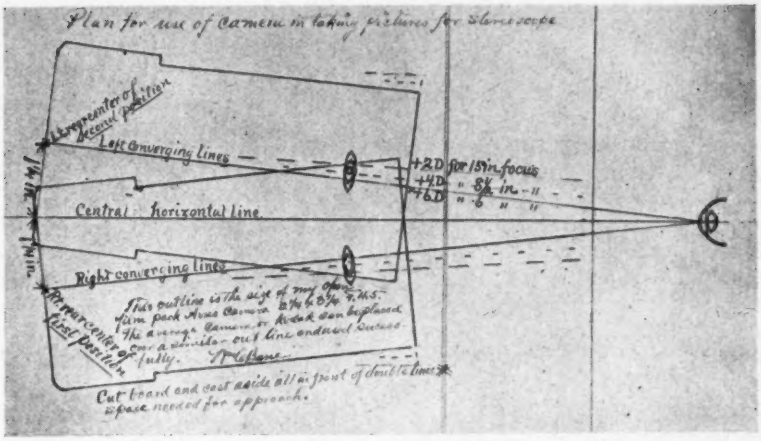
Plan for use of camera in taking pictures for stereoscope
Left converging lines
+2D for 15 in. focus
+4D " 8½ in. "
+6D " 6 " "
Central horizontal line
Right converging lines
Cut board and cast aside all in front of double lines
space needed for approach.

Fig. 1 (Bane). Showing the positions of the camera in taking pictures for stereoscopic views.

Fig. 2

Fig. 3

Figs. 2 and 3 (Bane). Stereo-photographs of a case of basal-cell epithelioma on the right lower eyelid, in a man 53 years of age. The growth had been five years in developing. The pictures demonstrate what good results can be obtained with a single camera by the method described in the article.

apart and to steady the head. A headrest, or head and chin rest, is a valuable aid. Most ophthalmologists have a treatment chair, the head rest of which is a great aid. An adjustable, rigid tripod on which may be fastened a board 9 x 12 inches in size makes an ideal platform for a camera.

Immediately following the taking of a picture, a record should be made of the relevant name, age, address, date, diagnosis, and remarks. As soon as the prints are obtained, the negative and prints should be marked with eternal black ink, and filed in alphabetical order, or the prints may be attached to the case record. In some cases, slides may be desired. They can be made from the negatives in black and white and tinted with water colors before they are mounted.

The taking of stereoscopic pictures is an interesting feature, yet simple and inexpensive. These can be made by the use of a single roll film, or a film-pack camera. The same method is followed

as in taking single pictures, except that two pictures are taken, one from the right, and the other from the left of a horizontal line that points to the center of the object to be photographed. The rear of the camera is set so that in the first position the center of the rear surface of the camera is 1¼ inches to the right of the horizontal line, and in the second position is 1¼ inches to the left of the center line. The center of the front of the camera is on a converging line, right and left according to the distance from the supplementary lens used, to the center of the object to be photographed. The surface of the platform on which the camera rests should be rough, with a covering of pasteboard, or fine sand paper to prevent slipping. The covering should be ruled, having a center line, and converging lines for the different strengths of supplementary lenses. Additional markings on the platform corresponding to the rear, front, and sides, indicating the exact position where the camera should rest, are desirable. Figure 1 shows the positions of the camera in taking pictures for stereoscopic views.

Bausch and Lomb have placed on the market a fine stereo-ophthalmic camera for photographing the eye. It is complete in every detail and makes good pictures. The cost is $350.00, plus $50.00 for the table. The method I have described works perfectly for stereoscopic pictures without additional expense beyond the few cents for the extra picture (figs. 2 and 3). A slide can be made from either negative. The stereoscopic pictures printed on dull paper take the Roehrig Transparent Oil-Photo-Colors nicely, giving them a lifelike appearance.

A stereoscope is very desirable for looking at mounted stereoscopic pictures. There is a "trick" by which the two views when mounted 1⅞ inches apart can be fused by an extra effort at convergence and accommodation, an action that is not comfortably performed. Stereoscopic pictures should be set nearly three inches from center to center. In the absence of a stereoscope, the sphere-prism combination is readily obtained by placing in a two-cell trial frame a pair of eight-degree prisms, base outward, with a +2½ D. sphere in the frame. By holding the lens combination about three inches in front of the eyes, and approximately twelve inches from the mounted stereoscopic pictures, a perfect view is obtained. A good stereoscope is obtainable from the Keystone View Company of Meadville, Pennsylvania, for $2.50. The section of the stereoscope with the lenses and eye shield removed from the shaft is adapted for observing magazine and book stereoscopic pictures.

The taking of colored pictures to be mounted in slides is interesting and not difficult to perform, if instructions are followed accurately. With a film-pack camera, having plate holders, color pictures may be taken by four different processes, or rather, by using four different companies' products. There is the Finlay method; the Dufay color process—the newest on the market; the Lumière filmcolor; and the Agfa color plates. I have used the Lumière filmcolor and the Agfa color plates with satisfaction. Pictures with the Agfa color plates are easily made. By using a photoflood lamp in a reflector, at an angle of 45 degrees to one side of the eye, and the bulb about eight inches from the eye, a picture is obtained in one fifth of a second without a filter. For illustrating and teaching purposes, the color photographs are invaluable.

1616 Tremont Place.

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NOTES, CASES, INSTRUMENTS

LENTICULAR ACCOMMODATION*

WILLIAM H. LUEDDE, M.D.
SAINT LOUIS

If fact instead of fancy is to become our guide in the interpretation of the mechanism of accommodation, the theory of the innate elasticity of the lens substance must be cast aside. Salzmann and Seeburger have disproved the assumption that true elastic-tissue fibers are present in the capsule of the crystalline lens, and recent experiments by v. Pflugk have demonstrated that the elasticity of the zonula is apparently nine times greater than that of the lens capsule.

Three quarters of a century ago even v. Helmholtz believed that the vitreous humor was a structureless mass subject to the laws of hydrostatic pressure and that the zonula was a membrane. Now it is proven beyond question that the normal vitreous has a definite though exceedingly minute fibrillary structure which is more dense in the anterior segment where it is so firmly attached to the ora serrata, the so-called base of the vitreous, that attempts to tear it away invariably leave microscopic shreds in situ, and the zonula is best described as a system of tiny cords (Berger's "petite cordelettes"). Neither is there any longer any doubt that when accommodative changes in the form of the lens are inaugurated by contraction of the ciliary muscle, there is an impact of the vitreous against the posterior surface of the lens, thus eliminating the proposition advanced by v. Hess and Gullstrand that to achieve increased convexity of the lens by relaxation of the zonula, the pressure on its anterior and posterior surfaces must be equal. Hensen and Voelckers observed that the vitreous advanced and moved toward the lens in the anterior peripheral segment. They properly ascribed this movement of the vitreous to the contraction of the longitudinal (Bruecke's) portion of the ciliary muscle, but ignored its possible effect on the form of the lens. My experiments on monkeys' and on human eyes showed that a space between the vitreous and the zonule, present in atropinized eyes, was closed under eserine. Furthermore, my observations on the effect of miotics on spontaneously subluxated lenses in human eyes demonstrated positively that movement of the vitreous humor produced displacement of these lenses. If the impact of the vitreous can and does produce displacement of lenses partially attached by zonular fibers, then it can and does produce modification in the form of the plastic lens substance within its thin flabby capsule when the zonular fibers and the annular hyalo-capsular ligament of Wieger are intact. It is not so much a question of the relative density of the vitreous and the lens as it is of the force of the impact. Waves of water may topple over stone walls and thin air may blow down great trees and buildings if the force of the impact is sufficient. Thus, we are able to explain the high degrees of accommodative power in middle aged persons noted by Barrett and Lang under ciliary spasm from eserine, which v. Hess declared to be utterly incomprehensible.

Subject to the law of surface tension, a fluid or semifluid mass will assume a spherical outline when surrounded by uniform pressure on all sides. While the lens is in situ, this condition cannot obtain because of its zonular and postcapsular attachments. Increase or decrease in the convexity of the lens occurs in response to traction made upon it by the zonule. Einthoven experimentally demonstrated that when this traction is made in the direction forward and outward, the lens becomes relatively flatter on its anterior and posterior surfaces and that when the traction is backward and outward, there is increased convexity of these surfaces. Einthoven, whose

* From the Department of Ophthalmology, St. Louis University School of Medicine. This report is condensed from a paper read before the St. Louis Ophthalmic Society, November 23, 1934.

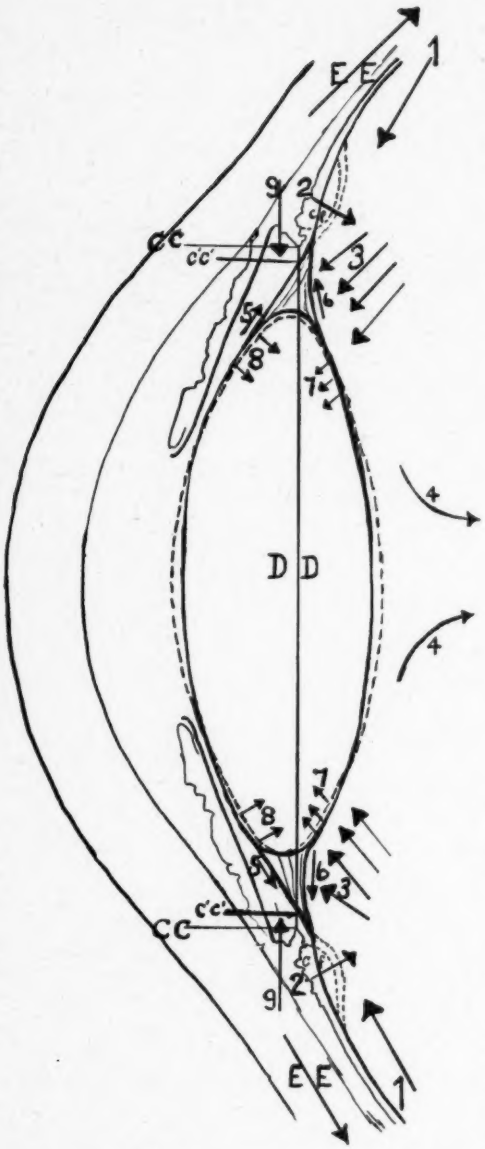

Fig. 1 (Luedde). Chart showing actual mechanism of accommodation based on experimental physiology and Salzmann's photomicrograph of normal anatomical relations. The ciliary processes which have no part in the mechanism are eliminated. Lines representing those zonular fibers which run longitudinally in the valleys between the ciliary processes and are known as the accommodative bundles have been inserted. Directional arrows (1 to 9) indicate the effect of contraction of the ciliary musculature in accommodation.

The diameter of the corona ciliaris (CC) with accommodation at rest is indicated by the extreme length of the vertical line—DD. The shortening of this diameter when the ciliary body is thickened by complete muscular contraction is indicated by the shorter cross lines (c'c') near each end of DD.

Arrow 1—indicates the forward movement of the vitreous humor produced by traction on the base of the vitreous at the ora serrata, through contraction of the longitudinal fibers of the ciliary muscle, possibly supported by pressure against the vitreous through forward traction on the choroid.

Arrow 2—indicates centripetal movement of orbiculus ciliaris produced by contraction of annular fibers (Mueller's portion) of ciliary muscle.

Arrow 3—indicates coalescence of the forward and inward forces in the vitreous projected against lens.

Arrow 4—indicates a possible central movement backward within the vitreous humor to replace that which has been drawn forward at the ora serrata.

Arrow 5—indicates traction backward and outward on anterior longitudinal bundles of zonula produced by contraction of Mueller's muscle as it approaches its contraction form (Cf) indicated by dotted lines.

Arrow 6—indicates similar traction upon posterior longitudinal zonular bundles accentuated by direct pressure from vitreous.

Arrows 7 and 8—indicate resulting centripetal intracapsular movements of the plastic perinuclear lens substance to produce an anterior lenticonus as demonstrated by Tscherning and the apparent posterior lenticonus by v. Pflugk.

Arrow 9—indicates final concentric narrowing of inner circumference of corona ciliaris as marked off on diameter DD, when ciliary musculature approximates its full contraction from Cf, slightly loosening the anchorage at the posterior border of the corona ciliaris of the decussation of the zonule. This permits the lens and adjacent anterior segment of the vitreous to sink in response to gravity or to tremble after sudden jerks of the eyeball without relaxing the forcible impress of vitreous against the plastic lens in accommodation.

The arrows at the top and bottom of the chart (EE) refer to the direction of traction in the experiment of Einthoven by which convexity of the lens was increased as indicated by the dotted outline of the accommodated lens. (It must be added that Einthoven's experiment, here represented diagrammatically, on the human eye, was made on calves' eyes.)

early experimental studies of the mechanism of accommodation were eclipsed by the brilliance of his later contributions to the knowledge of cardiac enervation, actually confirmed the contention of Tscherning and explained away the criticism of v. Hess in regard to the effect of traction on the zonula. Einthoven found that the "trembling" of the lens was least when the head is bent forward, and greatest when it is bent back. In the latter position, the lens lies on top of the vitreous like a bead upon a mound of jelly, while in the former, the weight of the vitreous is resting upon the lens. Thus Einthoven almost found the explanation of this puzzling phenomenon of relaxation of the lens, which may happen when accommodation has reached its acme, but he failed to consider the last step in the mechanism, which is diminution in the diameter of the corona ciliaris, permitting relaxation of the suspensory fibers of the zonule. However, it would appear that this relaxation of the zonule which comes at the end of the supreme effort of accommodation is no more a part of that mechanism than is rigor mortis a part of actual living.

A better understanding of the mechanism of lenticular accommodation emphasizes the clinical significance of the well-known structural differences of the ciliary musculature in hypermetropic or myopic eyes. In the myopic type the circular portion is very weakly developed or may fail entirely, while in the hypermetropic type it is very strongly developed; but Salzmann adds that this relationship must not be conceived to indicate that the musculature in the hypermetropic eye is hypertrophic or that of the myopic eye atrophic, because the whole mass of the muscle in the myopic type may be even greater than in the hypermetropic eye. In the myopic eye, the contraction of the predominant longitudinal ciliary muscular bundles requires relatively greater excursions forward of the retina, choroid, and vitreous humor, increasing the liability of retinal detachment where the predisposing conditions, so well described by Lindner, may happen to be present. Clinically, complete cyclopegia with atropine maintained for a long period has satisfactorily arrested retinal detachment repeatedly and has seemed to make possible a spontaneous, permanent restoration to normal in the two instances.

On the other hand, the better flushing out of the anterior chamber by currents in the aqueous humor sent forward by this greater movement of the vitreous, as suggested by v. Pflugk's moving-picture demonstration of movements of the shred of pupillary membrane, would tend to promote better drainage and prevent increase of intraocular pressure. Thus, the ciliary muscular spasm excited by miotics may be a real factor in the beneficial effect of miotics in glaucoma.

The accompanying chart is based on the normal relations of the ciliary body, iris, and lens, as shown by the well-known photomicrograph of Salzmann. It must be remembered that the relative lenticonus found by Tscherning in actual measurements of the size and position of the anterior and posterior lens images, signifies a flattening or even an indentation in the equatorial zone while the axial zone of the lenticular surfaces becomes more convex.

1402 South Grand Boulevard.

HYPERPYREXIA FOLLOWING THE USE OF ATROPINE IN THE EYES OF CHILDREN

WILBER F. SWETT, M.D.
SAN FRANCISCO

Many physicians appear to be unfamiliar with the occurrence of hyperpyrexia following the use of atropine and are liable to be misled by it.

The use of atropine for the so-called true colic of infancy, in gastrospastic or enterospastic infants, requires large doses, usually enough to produce a flush. The amount of atropine required for gastrointestinal relaxation varies enormously, as it does in the time and extent of pupillary dilation. Whether a given patient will have fever with the other manifestations it is impossible to predict, but when it does occur it is usually in the patient's home, re-

quires careful explaining, and may lead to much unforeseen difficulty.

The problem is further complicated by the leukocytosis which not infrequently follows these administrations of atropine.

The length of time also varies but the fever usually starts in three to four hours after the oral administration. Its peak appears in six to eight hours and rapidly disappears.

The flushing provoked need not be disconcerting because the strong vasomotor reaction of atropine is constant in healthy individuals and seems to be a compensating phenomenon to counteract the temperature-raising action of the drug.

Infants and young children have a remarkable tolerance to atropine in spite of the occasional striking by-effects. In large doses or in sensitive individuals it causes systemic poisoning, headache, dryness of mouth, palpitation, and hyperpyrexia. The hyperthermia is attributed to the muscular excitement and the suppression of diaphoresis, but this has not been clearly established.

An explanation may lie in the fact that the solutions of atropine used vary so widely. U.S.P. atropine sulphate is an intimate mechanical mixture of dextro- and laevohyoscyamines. The purest atropine is supposed to have the two constituents in equal quantities. However L-rotatory hyoscyamus is from 12 to 40 times more powerful than the D-rotatory, and correspondingly more toxic. The reaction of atropine rests with the ratio of the D and L constituents.

The usual procedure is to instill one drop of a 1-percent or 0.5-percent solution every 10 minutes until three have been given, followed by the refraction in not less than an hour.

1 drop of 0.5-percent solution = .0032 or 1/20 gr.

1 drop of 1-percent solution = .0065 or 1/10 gr.

3 drops of 0.5-percent solution = .0097 or 1/6 gr.

3 drops of 1-percent solution = .0196 or 1/4 gr.

Since 1928, I have seen six cases of hyperpyrexia following the use of atropine as a cyclopegic. When it is realized that the adult dose is 1/150 of a grain, it seems surprising that we do not see more reactions following instillations of relatively huge doses.

It is important that the clinician recognize, not only the mouth-parching and mydriatic propensities of the atropine-alkaloid group but also that it may occasion unexpected irregularities of temperature in youthful patients.

490 Post Street.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

September 23, 1935

Dr. Walter Crane, president

Congenital anophthalmos and microphthalmos

Dr. George P. Landegger presented an 18-month-old baby whom he had first examined at the age of four weeks. At that time the right palpebral fissure measured about two thirds of the normal length and there was no eye to be found in the orbit. The socket looked as if an enucleation had been performed except that it was rather deep but narrow. At the apex of the cavity were dense fibroid tissues.

The left palpebral fissure was also short but it contained a globe that was less than half the normal size. The conjunctiva was negative. The cornea was shiny but opaque except for a small clear area nasally and above. The anterior chamber was extremely shallow. The color of the iris was a muddy brown. It appeared that there was hardly any iris stroma present.

The pupillary area was covered by the opaque cornea. The iris seemed to react to light. Deeper structures of the eye could not be seen. The fundus reflex was faint. No attempt was made to dilate the pupil because Staehli has noted that 20 percent of microphthalmic eyes develop glaucoma.

Dr. Landegger said that no change had occurred in the right orbit during the last 16 months. The left globe had grown decidedly in size. Seefelder in Innsbruck, who wrote a very interesting article about this condition, stated that such eyes sometimes grow considerably during the first few years of life. The cornea was now clearer but the chamber was still extremely shallow and the iris was lighter in color.

The sight was decidedly better than one would expect. The baby could pick up small articles like buttons even if they were only one fourth of an inch or smaller in diameter.

The child was otherwise normal. The birth had been uncomplicated. The parents were healthy and unrelated. An older child was normal.

In the literature Dr. Landegger found that there are three types of congenital microphthalmos: first, the pure microphthalmos, unduly small but normal eyes. These eyes are very hyperopic and usually develop glaucoma. The second type is the microphthalmos with coloboma bulbi. The third type is without proved coloboma but with other anomalies. He believed that the case presented probably belonged to the third group.

Anophthalmos occurs more frequently on both sides than unilaterally. There were, according to McLean, 33 cases reported during the 25 years from 1904 to 1929. Anophthalmos can be inherited. Lues does not play an important part in the history. One often finds other anomalies in the affected child. Anatomically there is frequently not even a trace of eye tissue in the orbit. At times, one finds rudimentary rests of mesodermal tissue corresponding to uvea and sclera, and sometimes ectodermal tissue in the orbit. In other cases there is a combination of both tissue varieties. The optic nerve and the optic tract in the geniculate body are usually completely missing.

Little about the cause of this anomaly is known. Mechanical factors due to amnionic strands were held responsible for it in former years. Lately the condition has been attributed to arrest of development of the primary optic vesicle early in embryonic life. However, in case of true microphthalmos, the orbit and external eye muscles are well developed, proving the independent development of these structures.

Gasteiger and Hidano were able to produce these malformations in animal experiment. They exposed pregnant rats for many hours a day for several

days to unfiltered X rays; some of their offspring had the aforementioned anomalies.

Unusual foreign body in the orbit

Dr. Landegger presented a patient who had had the following history: A glass tumbler struck the right side of the face in 1915. The lacerated eye was successfully removed three hours later.

The left eye developed a very severe luetic interstitial keratitis in 1920. The eye was under treatment by several eye specialists in the East for two years.

The complaint which brought him to an ophthalmologist recently was that he had been unable to wear his glass eye in comfort since the beginning of 1935. When the prosthesis was removed a piece of thick clear glass was seen protruding about 1 cm. out of the orbit. Dr. Landegger said he could not remove the glass with fingers because of the sharp edges that were still caught under the irritated conjunctiva, but with forceps it finally came free. The glass was about 2 cm. long, 1 cm. wide, and .5 cm. thick. It had been imbedded in the orbit for 20 years.

Harold F. Whalman,
Recorder.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

October 8, 1935

Dr. A. C. Lewis, presiding

Late complications following cataract extraction

Dr. Phil M. Lewis first reported the case of a white woman, aged 74 years, who had had no pain or trouble following a simple intracapsular extraction until the fourth week. She then began to have severe pain and redness of the eye every afternoon which was relieved temporarily by two or three empirin tablets. A mild iritis was found. Soon the unoperated-on eye also developed the same condition. The iritis continued for two months although atropine and hot compresses were used. Small infected tonsils were present and their removal was decided upon in spite of the patient's age. The result was a happy one, no trouble having occurred since their removal. Vision was not damaged, being 20/20 and Jaeger 1.

The second patient, a Negro man, aged 65 years, had had simple intracapsular extractions of both eyes with apparently perfect results. Vision was normal in each eye and there had been no pain or inflammation until about five weeks after operation. The right eye then became painful, with a tension of 40 mm. Hg (Schiötz). Miotics reduced the tension to 30, and the eye became fairly comfortable. The pupil was centrally located, and there was no apparent reason for the glaucoma. The patient was seen again about ten weeks after operation. Vision was reduced to 20/70, but the tension was only moderately elevated. He was not seen again for over three months after operation. He then said the right eye had been paining severely for the past few days. The iris was found to have prolapsed through the wound at the "2-o'clock" position and was there incarcerated beneath the conjunctiva. Prolapse of the iris occurring as late as this after operation was unique in Dr. Lewis's experience.

The third patient was a 67-year-old white woman who had had a cataract complicated by a fluid vitreous containing many opacities. She also had a blood pressure of 220/110, severe dental sepsis, and both albumen and sugar in the urine. Four months were spent preparing her for the operation. An extracapsular extraction with complete iridectomy was performed with the loss of a very small amount of vitreous. There was little postoperative reaction and the wound healed promptly. Five weeks later, vision was 20/30 —3 with the proper lens. Two weeks after this she suddenly noticed some peculiar yellow flashes in her eye and then found that she could not see. Examination showed a large bullous bilobed detachment of the retina above and temporally, hanging down so as to cover the macula and disc. Transillumination was negative. The patient said she had been to a chiropractor for treatment the day before and that he had jerked and pounded

her neck severely. Due to the poor general physical condition and the danger of prolonged confinement to bed, operation was not advised.

Restoration of the socket

Dr. Phil M. Lewis presented a patient on whom he had recently operated for a partial obliteration of the socket. J. D., aged 75 years, had been badly burned in 1923 when hot babbit splashed into his right eye. Blindness followed immediately, but enucleation was not performed until 1933. Extensive loss of tissue must have resulted from the burn. When first seen in July, 1935, there was a complete obliteration of the lower culdesac and only a small pocket, about 1 cm. in length, at the outer half of the upper lid remained. He had therefore never been able to wear a prosthesis. The entire lower lid was contracted and drawn over toward the nose.

Operation was performed on August 9, 1935, by the method of Dr. John M. Wheeler. The graft was taken from the thigh. The lower lid was moved temporally by a plastic operation on September 27, 1935. The cilia of both lids were badly distorted, but were being trained by applying flexible collodion. He was now successfully wearing an artificial eye.

Tattooing of cornea

Dr. Phil M. Lewis presented L. H., a 7-year-old girl, who formerly had a dense white scar of the cornea of the left eye large enough to cover the entire pupillary area. It was very noticeable and vision was reduced to 15/200. The scar resulted from an injury with a stick three or four years previously.

An optical iridectomy was performed August 2, 1935, which improved vision to 20/70. Several weeks later the leucoma was tattooed with platinum chloride and hydrazene hydrate. Both operations were done under local anesthesia. Moderate pain for the first 24 hours followed the tattooing. The appearance of the eye was very good.

Cataract and optic atrophy

Dr. R. O. Rychener presented Mr. T. J. T., aged 56 years, on whose right eye he had operated for mature cataract. The lens was clear in the left eye but vision was reduced to 6/60 because of luetic optic atrophy.

Although light perception in the right eye had been very poor and projection questionable, removal of the cataract disclosed a nerve of fair color and one month later vision with correction was 6/5 and J. 1.

Discussion. Dr. E. C. Ellett said that his experience included several such satisfactory results, particularly in cases of simple glaucoma in which cataract had been a late complication. He thought it worth while to give the patient the benefit of surgery with a guarded prognosis.

R. O. Rychener,
Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

October 11, 1935

Mr. Ransom Pickard, president

Hyperphoria associated with over-action of the inferior oblique muscle

Mr. A. Rugg-Gunn presented a 10-year-old boy who had been sent to him a year ago. After correction (low mixed astigmatism), the vision was 6/9 in the right eye, and in the primary position the eyes appeared to be about level, but at least 20D. of hyperphoria was found on testing with the Maddox rods. All the movements were full and coördinated except that on looking to the left, towards the end of the movement, the right eye suddenly shot up, so indicating over-activity of its inferior oblique. When reëxamined 10 weeks after recession of the inferior oblique there was no sign of the former upward flick of the right eye when the boy looked to the left, and at the time of showing the case the hyperphoria was about 10D.

Temple Smith, of Sidney, has written a paper dealing with the operative treatment of cases of this type by tenotomy (a term which Mr. Rugg-Gunn considered inapplicable to de-

scribe division of the origin of a muscle) of the inferior oblique, and the suggestion seemed a reasonable one. The inferior oblique and the superior rectus of the opposite side are complementary muscles, and in the position of adduction the main elevator is the inferior oblique. Temple Smith suggested that the primary cause of this syndrome is weakness of a superior rectus. Weakness of one member of the pair causes over-action of the other, leading to hypertrophy, which, in turn, causes an accentuation of the diplopia when the eye is in the position of adduction. On looking directly forwards the action of the oblique is at minimum, and the eyes are relatively level: but on looking laterally, the action of the oblique is maximal and the eye shoots up.

An incision was made along the inner part of the lower orbital margin, and the tissues down to the periosteum were separated. A strabismus hook passed along the orbital floor from the outer side picked up the muscle at its origin. The muscle was grasped by a Prince's forceps, cut from its origin close to the periosteum, and a single catgut stitch inserted. The muscle was now reattached to the periosteum by means of the catgut suture along the line of its axis, about one-fourth inch posterior to its original attachment.

The bipolar electrolytic treatment of detachment of the retina

Mr. Cole Marshall said this was yet another method of treatment of retinal detachment, and he hoped members would try it. It was not until Vogt published his paper entitled "Cathode electrolysis, a new method for the cure of retinal detachment," in May, 1934, and also short articles, that much notice was taken of its use. Vogt claimed to be able to perform several operations on an eye without very much reaction. The poles, being somewhat sharp, penetrated a little into the tissue. The amount of choroiditis could be varied according to the strength of the current used. The distance between the points could be easily varied. Vogt used a very thin long needle. After preparing the sclera in the usual way and marking out the position of the tear, the anode, which could be in the shape of a Larsson ball, was placed on the surface of the eyeball a few millimeters from the point at which the punctures were made. The current was turned on, and the long needle pushed through the sclera deep enough to reach the retina. Vogt claimed that this could be done without any serious loss of vitreous. The needle was kept in no longer than one second. His aim was to surround the tear with punctures as well as to puncture the actual area of the tear.

The following were advantages claimed by Vogt for the method: (1) the diathermy needle pierced the retina in a dangerous way, whereas the electrolytic needle did not harm the retina and produce artificial holes. A further advantage was that the current used was very small. (2) Other methods produced scar membranes, secondary holes, opacities of the lens, optic neuritis. (3) Very small amounts of vitreous were lost in comparison with that following other operations. (4) It could be used as a method of localization, as fine bubbles, looking like frog spawn, could be seen at the point of the cathode, and these showed the position of the tear. (5) The method was very simple and harmless, and if the eye had been prepared on the previous day and the cornea kept clear during the operation, it was finished in a short time. Vogt did not use any corneal anesthetic, depending on the deep injections. (6) It was very successful in old people and in those who had old detachments. A great disadvantage attached to the Larsson method was that in using it the current wandered all over the eye.

Binocular vision in everyday life: with a description of the binocular gauge

Wing Commander P. C. Livingstone said that probably none would question that the possession of binocular vision, in many occupations which helped to make up the scheme of modern life, was not entirely comfortable. Primitive man used his eyes for scanning open spaces, either in search of food or to discover the approach of his enemies. His close

work consisted of chiseling flint arrows and spearheads, and so, in this direction, he escaped lightly. Later, according to need, higher levels developed, and a more exacting analysis of what was seen exercised the mind. The earliest visual appreciation of objects binocularly was bidimensional in character, and it was reasonable to assume that higher analysis tended to lag behind anatomical developments. During an investigation as to the causes of eye strain in workers at the Government Weights and Measures Department it was found that all those engaged in burette comparisons had heterophoria, some indeed to such a degree as to reduce their speed of work and their efficiency. Similarly, at the Kodak works, among those employed in the manufacture of key-winders the binocular powers were subjected to a constant strain of two to three meter angles of convergence, with much added concentration. But far the largest number of cases came to him from the electrical and wireless school and the apprentice-clerks department. In many instances the breakdown of convergence was the actual cause.

For ascertaining the measurement of the muscle state in near deviation he had designed a little apparatus, which he named the binocular gauge. It was a wooden rule, 40 cm. long, with a slight groove down the center 30 cm. long, and with one end shaped to fit the face and to rest against the infraorbital margin. It was marked in centimeters and half centimeters, measured from the anterior corneal surface. Going with it were three attachments: (1) a shield near the face to occlude either eye separately, and used in the estimation of monocular accommodation. This shield, when detached from the instrument, could be used also as a cover for the eye when carrying out the cover test. (2) A vertical rod, painted in equal thirds, in white and black, the black section being central, thus offering the black surface to the subject when making the convergence test, and to direct his eyes along the horizontal plane. (3) A small box-shaped attachment consisting of a front surface in which a cross was cut, and a back space into which an ivory square was fitted, with a black vertical line cut into its substance. This could be adjusted to a central position, as indicated on a small scale on top. This measured subjective convergence. On the ivorine square on either side of the vertical line three similar letters were printed and were used in measuring accommodation.

This gauge was now being used as a part of the routine ophthalmologic examination of flying staffs, for in a short space of time it was possible to estimate: (a) the convergence power, in two ways: (b) to discover the master eye: (c) to examine the accommodation, and (d) to perform the cover test.

It had its place also in refractive work, particularly in connection with presbyopia. With the presbyopic correction before the patient's eyes, he registered first the accommodation or near point, and then he made the convergence tests. The figure for the latter should be at least 10 cm. less than that of the accommodation, say accommodation 28 cm., subjective convergence 15 cm. This saved one from making the possible error of placing the accommodation near point and the convergence near point on top of each other, with subsequent ocular fatigue, and possibly more extensive damage. This practice he extended also to cases in children, as it was not uncommon to find a very definite weakness in a school child who was studying, as at the present day children had severe tasks set them.

He thought this gauge filled a gap between the Bishop Harman diaphragm test on one hand, and the Maddox rod test on the other, and so should be of value in a considerable number of cases.

(Reported by H. Dickinson.)

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RETINAL LESIONS AND GENERAL PROGNOSIS

In some respects ophthalmology stands out as the most definitely limited field of medical practice. Yet as regards study of the ocular background the relationship between general diseases and the work of the eye physician is intimate.

Nowhere else in the human body is it possible to observe directly, from day to day, the behavior of arterioles whose internal diameter is somewhere in the neighborhood of ten to fifteen microns, the estimated size of the minute vessels which "with a good ophthalmoscope and a clear eye" (Harry Friedenwald, Doyne Memorial Lecture, Transactions of the Ophthalmological Society of the United Kingdom, 1930, volume 50, page 452) may be studied in the macular region. If any single important detail of specialized technique should be mastered by the general physician and the internist, it is the use of the ophthalmoscope.

Wüllenweber (Zeitschrift für Augenheilkunde, 1935, volume eighty-seven, p. 175) calls attention to the widespread significance of retinal hemorrhages in the diagnosis, prognosis, and treatment of general disorders. Hemorrhages in the retina are mostly an expression of disturbances in the whole organism. While in some diseases the presence of ocular changes possesses for the general physician a merely incidental interest, there are other conditions in which the ophthalmoscopic picture speaks decisively as regards the clinical picture.

Since Helmholtz's invention of the ophthalmoscope in 1851, much has been written as to the significance of changes in the retinal vessels. Friedenwald, in his Doyne Memorial Lecture above referred to, has given us one of the best monographs on the subject. He reminds us that, although as early as 1876 Gowers had determined the true significance of the change in the retinal arteries in Bright's disease, Gowers

made no mention of these appearances in his volume on "Medical Ophthalmoscopy," published in 1890. He included a brief statement to the effect that the retinal arteries were far below the size in which atheromatous changes were common. Gunn published his classic "Ophthalmoscopic evidence of general arterial disease" in 1898.

Hemorrhage from the retinal vessels may occur in various infectious diseases, and minute or even larger hemorrhages are not infrequently present during influenza. Miliary hemorrhages occur in the brain in the course of the same disease. The prognosis is good. The presence of retinal hemorrhage in a case of endocarditis, on the other hand, is distinctly unfavorable as regards the general outcome. In tuberculous retinal periphlebitis an underlying lesion in the lung may be assumed, but is not clinically demonstrable.

Although very striking ophthalmoscopic appearances are encountered in leukemia and other blood diseases, the general diagnosis is usually made without dependence upon the retinal findings. But there are occasional cases in which retinal disturbances first call the patient's attention to his general condition; and in a few cases a study of the retinal hemorrhages has some importance in therapeutic management.

As concerning the ophthalmologist, ocular disturbances incidental to avitaminosis and other disorders which lead to hemorrhage beneath the skin and mucous membrane have significance only to the extent that the possible connection should not be ignored, rather than as to any prospective responsibility toward the general physician or internist. But, since the distribution and size of ecchymoses in such cases is influenced by gravity and therefore by bodily posture, Wüllenweber suggests that the patient should be advised to keep the head raised during recumbency.

The meaning of the retinal changes in diabetes has been disputed. Volhard's statement that diabetic retinitis does not occur without vascular changes is discredited by some writers, but is supported by Wagener and Wilder. When diabetes is suspected on the basis of retinal lesions, it must not be forgotten that urinary examination is inadequate without determination of the sugar content of the blood. Of Onfray's series of cases only one half lived more than three years after the retinal changes were first observed.

According to Noorden and Isaak, greater severity of retinal vascular changes in diabetes calls for greater care and restraint in treatment with insulin, in order to avoid the added danger of coma, epileptiform seizures, and insulin shock.

The greatest field for coöperation between the ophthalmologist and the internist or general physician lies in the cardiac and nephritic group of degenerative diseases. Here, also, complete unanimity of judgment is lacking; but there is substantial agreement on a number of important points.

Nephritic retinitis only occurs in the presence of increased blood pressure although it may have begun during the period of decompensation and may be first encountered during a period of decompensation or after improvement of the general condition. Paradoxically, as regards nomenclature, it may be found in the absence of any demonstrable disturbance of kidney function. Nephritis without increase of blood pressure does not provoke retinitis.

Volhard (quoted by Wüllenweber) and others consider the cause of the kidney and cerebral and also of the retinal changes in nephritis to lie in a spasm or cramp of the arterioles.

The respective conditions to which Volhard gives the titles of "pale hypertension" and "red hypertension" correspond to Friedenwald's "arteriosclerosis with hypertension" and "arteriolar sclerosis."

Using the language of our American colleague, in arteriosclerosis with hypertension there is general reduction in caliber of the whole arterial tree, the arteries are straight, branch at an acute angle, show fine variations in caliber (beading) and increased visibility of the walls (with disappearance of the reflex

stripe) and there is marked arteriovenous constriction; whereas in arteriolar sclerosis the larger arteries are full and tortuous, with widening of the reflex stripe and moderate arteriovenous constriction, and the arteries branch at right angles. Particularly, the terminal arterioles show irregular tortuosity, fine variations in caliber, visibility of the walls, and the so-called silver-wire change. In senile cases, especially, retinal arteriosclerosis may exist without hypertension.

There seems to be general agreement that in apoplexy the histologic condition most commonly found in the retinal arteries is atheroma of the larger branches. The parallelism between brain and retina lacks completeness in that (1) the retinal arteries are of smaller caliber than those cerebral vessels from which apoplectic hemorrhages usually occur, (2) the retinal arteries are supported by the intraocular tension, and (3) the phenomenon of arteriovenous constriction is peculiar to the retina and cannot therefore be thought of as predicating a tendency to thrombosis in cerebral venules.

W. H. Crisp.

THROMBOSIS OF THE CAVERNOUS SINUS

This is a rare condition that usually ends in death. It is probably better indicated by the name thrombophlebitis. In most cases the walls of the sinus are involved and it arises by extension from the veins that are connected with the sinus. In the larger number of cases, it is secondary to thrombosis of the other intracranial sinuses, petrosal, nasal, or even the mastoid venous channels. But sometimes it comes through the ophthalmic veins from infection of the lids, cheeks or lips, styes, furuncles, or minute pustules, or infections of hair follicles, or it may arise from inflammation of a vein in the orbit.

When the initial lesion is in the skin of the face, the nose, or the orbit, the first serious symptoms are pain and swelling in the orbit. Such cases come to the ophthalmologist for diagnosis. Early diagnosis and prompt treatment are essential to save the life of the patient. Sometimes the nature of the case is indicated by loss of vision, swelling of the retinal veins, or disturbance of the ocular movements. But these symptoms may all be absent. The involvement of the second eye may give convincing evidence that the disease involves the cavernous sinus. But this may not be noticeable until it is too late to save the patient. In rare cases the initial lesion may be on one side of the face, and the pain and swelling of the orbit on the other side. This should instantly direct attention to the cavernous sinus.

Opening of the sinus and drainage, without removal of the clot, has, in a few instances, saved life and effected a cure. But after apparent recovery, death may occur from chronic and unrecognized cerebral abscess. Recently a cure by a new method, has been reported by Browder and Myerson of Brooklyn (Archives of Oto-Laryngology, May, 1935). By a subtemporal opening the cavernous sinus was reached and its anterior portion occluded by electrocoagulation of its contents. The same results might be secured by removing the orbital contents and occluding the ophthalmic vein where it passes through the sphenoidal fissure. The important thing is for the ophthalmologist, first consulted, to recognize the condition, and know that it can be cured by some such measure.

The great difficulty of diagnosis is to decide whether it is a case of cavernous sinus involvement or merely an orbital thrombophlebitis. Even if no thrombosis had yet occurred in the cavernous sinus and the process was still limited within the orbit, the danger of sinus thrombosis would justify surgical intervention to prevent it. If the eye were already blind it would be right to make the approach by removing the contents of the orbit. But in the above case sight remained good throughout; and a case in which sight remained good until death has been reported in the Transactions of the American Ophthalmological Society for 1901.

Cavernous-sinus thrombosis may present a very rare emergency. But train-

ing for the practice of ophthalmology should prepare us to recognize rare emergencies, and teach us how they should be met. Edward Jackson.

STATISTICS ON OCULAR NEOPLASMS

The acquisition of knowledge about malignant growths is one of the most important problems of modern medicine. Though some information has been gained by experimental study, statistical researches have remained the chief source of knowledge of this subject. From a very large number of well-worked-up cases, data as to relative prognoses if eyes are removed early or if late might be derived; the value of radio therapy might be determined, or the questions of etiology, for example, trauma, might be noted. Cellular types might be classified with their prognostic significance; associated clinical conditions might be observed.

No one individual can have sufficient cases in his personal experience nor can any one clinic contain enough material to offer conclusive data, hence, it is only by studying the figures from a multitude of individuals and clinics that criteria of value can be acquired.

To make such a study the full time of some interested ophthalmologist is required, and this usually necessitates a grant of some sort for financing the undertaking. Though these requirements may be in themselves sufficiently difficult, the lack of good statistics presents an even greater hinderance to a comprehensive survey.

The Rackham Ophthalmic Cancer Research, through the University of Michigan, has made it possible for Dr. Laura A. Lane to conduct a study of ophthalmic neoplasms during the past year. Many difficulties confront a worker in this field, chief among which is the absence of accurate information regarding the cases which have been observed. Exact records have never been made; there has been no follow-up; histories are missing. These things are usually irreparable, but the second difficulty, almost as great as the first, is certainly not incurable since it is merely a surprising lack of coöperation on the part of the profession. Very many letters have been sent, mostly brief, all enclosed with stamped envelopes, and yet very few replies have been received!

Dr. Lane has reported on 772 cases of ocular malignancy and is very desirous of increasing this number to a thousand, but time and funds do not permit visiting all clinics nor extensive traveling to interview individuals, so that the success of the work depends on the response of ophthalmologists to appeals for data.

A number of interesting observations have already been made and probably others will follow if more cases can be obtained. Such factors as the influence of occupation on the incidence of this disease, and the relation to influenza epidemics are being worked out.

To quote from Dr. Lane's letter, "During the past year the eye records of more than 20 large eye clinics, 4 large institutions devoted exclusively to study and treatment of malignant diseases, the Army Medical Museum collection, hundreds of records of ophthalmologists, and the records of the medical services of a number of industrial plants have been utilized in this study.

"An immense amount of follow-up work has had to be done. No eye clinic in this country was found to have any regular system of follow-up of its eye-cancer patients. As a result of these surveys several eye clinics have already started a periodic follow-up of their eye-cancer cases.

"In the cancer clinics, on the other hand, the records were well prepared; there was invariably some information on the occupation, and the follow-up was as high as 95 percent. The clinical and therapeutic histories in these institutions were much fuller and more complete than in the majority of the eye clinics. In a number of the eye clinics the lack of a cross index, pathological reports, and specimens of the tumor greatly increased the difficulties of obtaining the necessary material.

"In this study no case report has been included which did not have a sufficient pathological report or a microscopic slide to verify the diagnosis. Of late

years attempts have been made to classify and type the cells of malignant tumors as to their relative degree of malignancy. Some clinics have felt such typing of considerable value in prognosticating the course of a carcinoma. It has been noted that there is a tendency to attempt a similar classification in the sarcomata of the eye. After careful investigation and follow-up work it appears that such prognostication is not very accurate. Many times the pathological report commented upon the extreme malignancy of the tumor and warned to look out for early metastasis. The follow-up of the case in question often showed that the patient had lived for many years; in several instances more than ten years, with no evidences of recurrence or metastasis.

"If we are to classify tumors of the sarcomata group and study the cells, it appears that we should make serial sections. The malignant melanomas of the eye often differ widely in appearance of the cells in different parts of the same tumor.

"It is not improbable that the size, structure, and shape of the cells in the melanosarcomas may be affected by contact with the eye humors, the variations in their pH, along with the pressure exerted by the sclera and the tumor itself. Proximity of tumor cells to the vessels and the great variability in the vascularity of the sarcomata have influence on their structure and cell metabolism. In none of the institutions devoted to the eye did we find any investigation of any of these important cancer questions.

"Before we can be perfectly certain of our tumor classification, we need to know more about the nerves and nerve endings in the uveal tract; also about the epithelial-like cells containing pigment which are found in that part of the iris and ciliary body beyond the ora serrata. In tissue culture these cells behave like epithelium and grow in sheets. These constitute only a very small number of the pigmented cells of the uveal tract. More than 85 percent of the sections of the uveal-tract tumors studied in the surveys were of the connective-tissue type."

One cannot read of this work without being tremendously impressed with its value. Unfortunately the Rackham grant has expired and further funds may not be found to continue the research beyond a brief period, so it is of great importance that those ophthalmologists who have tumor cases will coöperate with Dr. Lane by sending to her the necessary relative data without delay, so that they may be available for a report to be presented at the next meeting of the American Medical Association.

Lawrence T. Post.

BOOK NOTICES

Concomitant strabismus. By T. B. Travers. Printed and published for The British Journal of Ophthalmology by George Pulman & Sons, Ltd., 1936. 127 pages, 21 Illus., 17 tables.

This is a monograph for the Gifford Edmonds Prize in Ophthalmology. It was distributed in January to subscribers to The British Journal of Ophthalmology. The full title is "A comparison between the visual results obtained by the various methods employed in the treatment of concomitant squint." This is an exceedingly worthy investigation. It presents the problem in the simplest and most adequate manner that has come to the reviewer's attention since the current revival of interest in orthoptics.

The theories of etiology are discussed briefly but adequately except that one or two frequently considered possibilities are not mentioned.

The chapter on binocular vision and abnormal retinal correspondence in squint is a remarkably clear exposition. The summary of it follows:

"(1) Abnormal retinal correspondence is a very common condition occurring in fifty to sixty percent of all cases of squint.

(2) One cause of abnormal retinal correspondence is the reaction of the brain to an abnormal position of the eyes.

(3) Abnormal retinal correspondence is most likely to occur when the

onset of squint is very early in life.

(4) If the angle of squint is large abnormal retinal correspondence is more likely to occur than if the angle is small.

(5) Abnormal retinal correspondence is very unlikely to occur if the angle of squint is less than ten degrees and seldom if the angle of squint is less than twenty degrees.

(6) The degree of squint which is associated with an abnormal retinal correspondence increases with age of onset of squint.

(7) The reëstablishment of normal correspondence is more likely to occur if the patient has not squinted for a large period of his life, and if the age of onset is relatively late."

One chapter is devoted to the optical treatment of squint. Another to amblyopia and its treatment. The author favors complete occlusion and does not attempt orthoptic training unless he can bring the vision to 6/12 or better. He has tried to measure the part of the squinting field that is suppressed while the other eye is fixating. He has used an original method for this. He found a scotoma in the deviating eye of a clearly functional type. It is in the same visual direction as the fixating macula and is probably caused by suppression, since, when the vision of two eyes is equally good or nearly so, it may be demonstrated in whichever eye happens to be squinting.

A full discussion of the orthoptic treatment of squint is given. Treatment fails in most cases of abnormal retinal correspondence. Neither alternating occlusion nor prism treatment has been valuable in abnormal retinal correspondence and operation is considered the most effective method so far devised for dealing with this anomaly, but orthoptic treatment is not often successful even after operation.

Patients with normal retinal correspondence may be divided into those who improved with fusion training within five lessons and those who did not improve with fusion training within five lessons. About 85 percent of the former developed good fusion and 85 percent of the latter never developed good fusion.

One chapter covers briefly the operative treatment used by the author. His results suggested that fusion alone was not a great restraining force toward producing or maintaining a good operative result.

In conclusion: The patient with concomitant strabismus will have one of the following conditions:

(1) An abnormal retinal correspondence

(2) Normal correspondence and poor fusion

(3) Normal correspondence and depth of fusion

In case one operation is indicated.

In case two orthoptic treatment may be tried but with little hope of doing good if the angle of squint is over 20 degrees. It is probably better to operate.

In case three orthoptic exercises should be given. "One may reasonably be hopeful of a good result" if the angle of squint is below 20 degrees. If over 20 degrees, operation in addition to orthoptic training may be required.

The tables cover the case histories from divers points of view. Many authorities have been consulted and there is a full reference list at the end of each chapter.

To all interested in orthoptics this monograph will be invaluable.

Lawrence T. Post.

Outlines of ophthalmology. By D. E. Rolf, M.D. Published from the Division of Ophthalmology, University of Chicago, 1935. 23 figures; 52 pages; paper covers; price 50 cents.

This has been published with the aid of a grant from the Kramer Fund of which Dr. E. V. L. Brown and Dr. Louis Bothman are trustees.

Part 1 is divided into five sections, Anatomy, Histology, Physiology, Muscles, and Optics. It is arranged in syllabus form. The information is given as headings and subheadings often in tabular form. This is probably the most

condensed manner of presentation of material possible. It is, of course, exceedingly difficult reading but it is intended only for student reference. The impression is gained that the book is provided for the undergraduate but some of the material seems too advanced for such groups especially, for example, several pages on retinoscopy and several more on the details of color vision and visual perceptions. On the whole Part 1 is satisfactory.

Part 3 on ocular therapeutics is disappointing. It contains only seven pages. Obviously, in such space only a few subjects can be mentioned and the reviewer is at a loss to understand the method of selecting these, as many common conditions are omitted and a few rare ones included in even this very limited space.

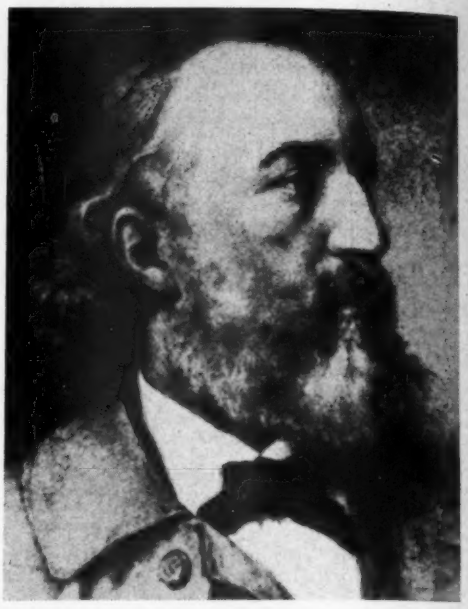
Lawrence T. Post.

OBITUARY

Adolph Barkan
A Pioneer Ophthalmologist

The notice published in this Journal (v. 18, p. 1156) called attention to the passing of one who played a leading part in the development of modern medicine. His life of over ninety years covered the period of the most active and important development of general science and of medicine, and a great period of activity in the growth of medical education. In that growth and development he took a vital interest and an active part.

He wrote: "When a boy of ten or eleven I decided to study medicine; and, having a blind aunt living with us a good deal of the time, my sympathies for the blind in general, were awakened at an early age." After completing his preparatory studies at the gymnasium, he commenced the study of medicine in the University of Vienna at the age of seventeen years. As he told it, "Practically the whole fourth year, of the prescribed five of the medical curriculum, I spent at the eye clinics and wards of Professor von Arlt, in common with two other students. We attended daily and made ourselves useful to the assistants—except for the morning clinics in internal medicine. This was perfectly compatible with the university rule of 'Lehr und Lehrfreiheit.' At the end of that year we were fairly prepared stu-



Adolph Barkan

dent oculists, saving the fact that we had not operated on the living. Before graduating (end of 1866) I put in a good deal of embryological research work on the eye, for one semester, at Brucke's physiological laboratory. At that time I had fully made up my mind to devote my life to helping the blind." He had also studied a year at Zürich, where Billroth was rising to prominence as a teacher of surgery. Barkan was thus a pioneer in the early practice, now common, of taking parts of the undergraduate medical course in different universities.

After his graduation at Vienna, he was, for one year, assistant to the chair of physiology at the University of Graz. Then he returned to Vienna, and was, for a year, "the youngest assistant" to the Ophthalmic Clinic of Professor von Jaeger. "By good chance I then received an appointment as resident physician to the Maryland Eye and Ear Infirmary in Baltimore." Dr. George

Reuling, surgeon-in-charge of the Infirmary, had graduated at Giessen in 1866, but was five years older than Dr. Barkan, and had served as assistant to Pagenstecher at Wiesbaden, and as surgeon in the Prussian Army.

After a year in Baltimore, Barkan settled in San Francisco. His early student, and later surgical colleague, Dr. Emmett Rixford writes, "Even as a boy Dr. Barkan developed an ambition to come to California in this somewhat amusing way: The family had been the victims of a Cossack raid, which the youngster bitterly resented; for a burly Cossack snatched away the bowl of sour milk which the boy was drinking, and drank it himself. In Gartenlaube, a German illustrated weekly, young Barkan read about the activities of the Vigilance Committee of the 50's in San Francisco, and said he wanted to go to a country where they did not have Cossack raids."

In San Francisco he soon met Dr. Elias Samuel Cooper, the surgeon, who had come to San Francisco in 1856 and in 1858 founded the first Medical College on the Pacific Coast. Barkan writes: "Otology I had studied in Vienna, and I practiced it from the beginning with ophthalmology; but only years later, having done work with Schwartze and Macewen, felt surgically at home in the ear." In 1872 he was appointed Professor of Ophthalmology and Otology in Cooper Medical College, which later became the Medical Department of Stanford University.

He was the last survivor of the original group which built up that Medical School. Dr. Rixford says: "Dr. Barkan was the most brilliant, most fascinating teacher of the group; but he was much more than a teacher—he was an inspiration to students and faculty alike. Next to his love of his family, his one great interest was in medical education. . . . As a teacher he was adored by his students, who were inspired by his enthusiasm." He was broadly interested in the advances of medicine. When he heard of immunization to tetanus and diphtheria he said, "this marks the beginning of a new era in medicine." In a faculty meeting, walking up and down the room, he suddenly said: "Gentlemen, we must have a professional physiologist." The faculty was electrified and ordered a full-time, trained physiologist before making sure where the salary was to come from. At another time he said, "We must have a pathologist," with a similar immediate result.

For the practice of his profession, he was always eager to keep fully abreast with the advances of the time. Every two or three years he crossed the continent (and, usually, the Atlantic ocean) to keep in touch with the latest discoveries and methods. His studies with Macewen and his energy and thoroughness, were recognized in 1880 by the degree of LL.D. from the University of Glasgow. He was the first to bring a Haab giant magnet to America, and some of his earlier experiences with it were recorded in two articles in Knapp's Archives of Ophthalmology. In the forty-two years spent in California he took fourteen of these trips. On one of them, in 1881, he married Louise Desepte of Baden, and brought his wife to San Francisco.

When, in 1896, the Lane Lectures were established in San Francisco, Barkan secured William Macewen to give the first Course. Again, in 1911, Professor Ernst Fuchs, who had been his friend since they had been students in Vienna, gave the Course of Lane Lectures. This was Fuchs's first visit to America, the beginning of his great popularity and influence in this country. Rixford names a list of prominent ophthalmologists who began their successful careers as assistants in Dr. Barkan's office. His Clinic, begun in 1873, was the largest and most popular teaching clinic on the Pacific Coast.

In 1894, the American Medical Association met in San Francisco. Dr. Barkan joined its Section on Ophthalmology and participated in its discussions. In 1906, to celebrate the fifty years of its existence, the California State Medical Association met in San Francisco, and invited men from the other western states to attend its meeting. It was proposed at this time to form a Pacific Coast Oto-Ophthalmological Society, and, on April 17th, one session devoted

to ophthalmology and otology was held, with Dr. Barkan presiding. The next morning came the earthquake and fire. The meeting was broken up, and no attempt was made to reorganize it, until the time of the Lane Lectures by Professor Fuchs in 1911. Then, on motion of C. F. Welty and Hans Barkan (recently graduated from the Harvard Medical School) a committee was formed to arrange for such a society. In 1913, the Society held its first annual meeting, with Dr. John F. Dickson, of Portland, as president. Since then it has met each year, and has grown to an active membership of 351. Dr. Welty became its president in 1918, and Dr. Hans Barkan in 1932. Its honorary members, who have taken an active part in the meetings, include Sir John Parsons and Col. Robert H. Elliot, of London, Franz Hanslinger of Vienna, and thirty teachers of ophthalmology and otolaryngology drawn from the principal medical centers of the United States.

Dr. Barkan kept up his interest in education for medicine and ophthalmology. In 1913 he had made his home again in Europe, and San Francisco the objective of his transatlantic trips. In 1910, the Graduate Course leading to diplomas in ophthalmology was begun in Oxford University. This stirred active interest in such courses in America. In 1913, the American Medical Association met in Minneapolis, and the evening of June 15th was given to discussion of the best preparation for ophthalmic practice. This was opened by a paper on "How ophthalmologists have prepared themselves for practice," in which the responses to a brief series of questions, by two hundred and fifty active and leading ophthalmologists were given. Dr. Barkan had received the questions in Munich, and responded with a letter, from which free quotations have already been made in this paper. He wrote:

"I am still deeply interested in that topic, and should be pleased of the opportunity to coöperate with a few men (seniors if possible) of good preparatory education, in the task to give the specialties of eye and ear the prominence and opportunity (clinical and otherwise) they deserve in the student curriculum, and in the state examinations. As long as my students had two clinics a week, one hospital clinic, and preparatory work in mirror (ophthalmoscope) practice, all went well; and, at the end of the second semester of uninterrupted work, the M.D. of Cooper Medical College was well prepared and did good work in city and country practice in California. Better work, I fear, than some of the products of the postgraduate schools of the present day, practicing in small and medium-sized towns. With the incoming regime of section work in clinical education, things have materially gone worse, in the specialties at any rate. At Professor Fuchs's request I have written a little "Feuilleton" on "Development of things medical in the West." This was translated into English (see "Prospect and retrospect," California State Journal of Medicine, 1913, April, p. 159).

A. Barkan, as his communications were signed, belongs in the group of pioneers who took part in the development of modern ophthalmology in the United States. It included Harry W. Williams in Boston, Elkanah Williams, in Cincinnati, Herman Knapp in New York, Squeir Littell, in Philadelphia, and John Green, of St. Louis.

In 1929, at the International Ophthalmological Congress held in Amsterdam, a luncheon was given by Americans to honor Professor Fuchs. In a picture of those present, appropriately seated in the front of the group, are the old comrades, Barkan and Fuchs with E. Treacher Collins, the chief organizer of that Congress, behind him Axenfeld, between Barkan and Fuchs the president of the Congress, Professor Van der Hoeve. This grouping symbolizes the association of men who were active pioneers in the development of modern ophthalmology.

Edward Jackson.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, history
19. Anatomy, embryology, and comparative ophthalmology

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5. CONJUNCTIVA

Cuénod, A., and Nataf, R. (Tunis). **The constant presence of numerous Rickettsioid bodies in the trachoma follicle.** Rev. Internat. du Trachome, 1935, v. 12, July, pp. 110-118.

Further study has demonstrated that the follicles contain: (1) epithelioid cells with large nuclei and abundant cytoplasm which is frequently surrounded by small granular shadows; (2) mononuclears without cytoplasm; (3) cells in karyokinesis in which the protoplasm is dotted with blue granules; (4) phagocytic cells of Leber; (5) blood cells; (6) protoplasmic granules forming the "plastille". The plastille is not débris, does not stain with gram stain, but is visualized with Giemsa. The size of the constituent granules is 0.2—0.4 microns, and they have the appearance of precipitated stain. The authors have drawn no definite conclusions but they hope further work will clarify the rôle of these particles in the etiology of trachoma. (2 illustrations.) P. J. Leinfelder.

Damel, C. S., and Rechniewski, C. **Analysis of 130 strains of staphylococcus pyogenes in chronic lesions of the conjunctiva.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Aug., p. 637.

Judged by their action on milk, sugars, and gelatin, 106 strains were found pathogenic. The material came from chronic lesions of the conjunctiva, some very mild, with only small quantities of secretion at the internal canthi. Preoperative examination of conjunctival secretion is therefore considered essential. M. Davidson.

Lindner, K. **Trachoma and paratrachoma.** Wiener med. Woch., 1935, no. 44, Oct. 26, p. 1191.

After discussing inclusion bodies in trachoma, Lindner describes an ocular condition which is transferred from the female genitals and is characterized by the presence of inclusion bodies. This condition he calls "paratrachoma". Whereas in the female it causes no genital difficulty, yet when children's eyes are infected by contact with the external genitalia of their mothers, smears show trachoma-like bodies.

Theodore M. Shapira.

Rice, C. E. **The carbohydrate matrix of the epithelial-cell inclusion in trachoma.** Amer. Jour. Ophth., 1936, v. 19, Jan., pp. 1-8.

Schmidt, Rolf. **Spectral analysis as reliable method for detection of metals in the human eye and its adnexa.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 440. (Ill.)

A circumscribed discoloration of the

conjunctiva, the cause of which could not be revealed by the usual chemical and histologic methods, was definitely proved to be argyrosis by spectral analysis. C. Zimmermann.

Strebel, J. **Principles and improvements in the causal and symptomatic treatment of hay fever or pollen allergy and anti-allergic therapy.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 525.

The subject is discussed in detail.
C. Zimmermann.

Szily, A. **Transmission of trachoma to the brain of the guinea pig.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 433. (Ill.)

Szily's experiments showed that inoculation of the brain of guinea pigs with trachomatous material was just as successful as intraocular inoculation. A further similarity between intraocular and cerebral inoculation exists in that, like the hyaloid membrane and choroid, the meninges are the points of origin and seat of the trachoma follicles. The retina and brain substance were not affected. The production of these follicles at points distant from the injection speaks for the action of a specific noxa which gives rise to a typical product, the follicle.
C. Zimmermann.

Tita, C. **Contribution to the pathology of the plica semilunaris.** Boll. d'Ocul., 1935, v. 14, Nov., pp. 1570-1614.

The author gives the history and macroscopic and microscopic description of a case of hypertrophy of the left plica due to chronic local irritation in a girl of four years, of a case of inflammatory hypertrophy in a man of 45 years, and of a case of hyalin degeneration in the trachomatous eye of a woman of eighteen years. He reports also a case of a cystic pigmentary nevus and four cases of submucous cyst in trachoma patients aged from 25 to 75 years. The cystic formations originated from epithelial inclusions or from occlusion of ducts of local glands. (Bibliography, 24 figures.)
M. Lombardo.

Tristaino, L. **Exploration of the reticulo-endothelial system with Congo red in trachoma patients.** Boll. d'Ocul., 1935, v. 14, Oct., pp. 1431-1443.

The author comes to the following conclusions: The more active the trachoma the higher the retention index. The behavior of the reticulo-endothelial system parallels that found in tuberculosis. A relation exists between trachoma and the tuberculous mesenchymopathic state. (Bibliography.)
M. Lombardo.

Vito, Pietro. **Further contribution to the study of the intradermal reactions for diagnostic purposes in trachoma.** Boll. d'Ocul., 1935, v. 14, Sept., pp. 1245-1250.

The antigen obtained from the conjunctiva, affected by trachoma in a florid stage and not yet treated, was injected intradermally in twenty patients affected by trachoma at any stage and not affected by constitutional diseases and in ten other patients affected by different ocular diseases. In eight hours an area of erythema developed, which began to disappear twenty-four hours later, having all the characters of a pseudoreaction. The author concludes that the antigen test does not at present lend itself to differential diagnosis. (Bibliography.)
M. Lombardo.

6. CORNEA AND SCLERA

Ammann, E. **Lupus erythematodes of the cornea.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 650. (Ill.)

After removal of a foreign body, a man of 37 years affected with lupus erythematodes of the scalp and external ear developed a dense disciform opacity of the corneal parenchyma. This was attributed to the lupus erythematodes. Under treatment with yellow mercurial ointment it healed without formation of blood vessels.
C. Zimmermann.

Bothman, L., and Rolf, D. E. **The Kayser-Fleischer ring in Wilson's disease and microcephaly.** Amer. Jour. Ophth., 1936, v. 19, Jan., pp. 26-33.

Ciotola, Guido. **The probable presence of elements of the reticulo-endothelial system in the parenchyma of the cornea.** Boll. d'Ocul., 1935, v. 14, Nov., pp. 1537-1553.

By iontophoresis the author introduced into the corneas of rabbits vital-coloring substances such as trypan blue and methylene blue. Histologic examination showed that cellular elements of the corneal parenchyma which appeared to be its fixed cells had retained the color in granular form. As far as the faculty of color retention is peculiar to the reticulo-endothelial system, these findings are to be considered as evidence of the presence of elements of this system in the cornea. (Bibliography, 5 figures.)

M. Lombardo.

Fischer, Franz. **Ciliary nerve loops in the posterior portion of the sclera.** Zeit. f. Augenh., 1935, v. 87, Nov., p. 284.

Intrascleral loops of ciliary nerves have been described and usually occur 2 to 3 mm. behind the limbus, as simple loops or as mushroom-like projections covered with dense connective tissue. In nearly all the cases a cluster of nerves of considerable thickness originated in the loop and continued forward. Fischer describes two new observations. In one eye the loop occurred 3 mm. below the entrance of the optic nerve and for the most part lay outside the sclera. In the second, one of the long ciliary nerves had an intrascleral course to the equator, where it emerged into the perichoroidal space and pursued a normal course anteriorly. In the intrascleral part occurred a distinct loop which overrode a long ciliary artery. In the same eye an anterior nerve loop was found.

F. Herbert Haessler.

Green, John. **Bullous keratitis: a rational therapy.** Amer. Jour. Ophth., 1936, v. 19, Jan., pp. 16-20.

Grolman, G. von. **Familial microcornea.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 741.

Microcornea is recorded in brother and sister. The corneas were from 8 to 9 mm. in diameter and of about normal curvature, with normal orbital diameter. In one case the refraction was not determined because of cataractous lenses, but in the other there was about 20 D. of myopia. Microcornea is therefore not always accompanied by microphthalmos.

M. Davidson.

Grüter, Wilhelm. **Experiences with treatment of serpent ulcer and ocular herpes with short-wave radiation.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 605. (Ill.)

The conclusions are: short-wave-radiation in ocular affections is superior to diathermy. Its biological effect is due to intense heating of the tissues which, without killing, inhibits the growth of bacteria, and increases the local metabolism, indicated by enduring edema of the corneal tissue and directly proved by an acute fibrinous exudation in the normal iris of the rabbit.

C. Zimmermann.

Hernandez, I. M., Lijo Pavia, J. and Dusseldorp, M. **Tuberculous bacillemia and scleral tuberculoma.** Rev. Oto-Neuro-Oft., 1935, v. 10, Oct., p. 273. (Ill.)

A tuberculoma of the sclera appeared in the course of acute general miliary tuberculosis in a youth of eighteen years. Inoculation and section of the enucleated eye established the diagnosis.

M. Davidson.

Horay, G. **Bilateral detachment of the retina in episcleritis spontaneously healed (Harada's disease?).** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 656. (See Section 10, Retina and vitreous.)

Karasek, Otto. **Retrobulbar neuritis, detachment of the retina, and paresis of the sixth nerve as initial symptoms of posterior scleritis.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 645. (See Section 10, Retina and vitreous.)

Orzalesi, Francesco. **Contribution to the diagnosis of keratoconus.** Boll., d'Ocul., 1935, v. 14, Oct., pp. 1384-1394.

If a beam of light is projected to-

ward the limbus of a normal eye in a direction parallel to the plane of the iris, and 2 to 4 cm. from it, a crescent-shaped shadow forms at the opposite periphery of the anterior chamber and inside of it a lighted zone. If the light is brought nearer or its angle of incidence is changed the shadow becomes smaller, while the lighted zone becomes more intense and larger until it reaches the opposite limbus. In keratoconus the lighted zone is more intense and is pointed in the direction of the opposite limbus, and on changing the angle of incidence of the beam of light the lighted zone moves toward the limbus, becomes smaller and less intense, and its point may go behind the limbus. The genesis of the phenomenon is studied and explanation given mathematically. (9 figures.)

M. Lombardo.

Pameijer, J. K. **A strange familial superficial alteration of the cornea.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 516. (Ill.)

Both corneae of a boy aged eight years were covered all over with fine grayish vesicles in the superficial layers except a clear strip extending from below center to the nasal side, and through which the integrity of the endothelium, iris, lens, and fundus could be ascertained. The parenchyma also was entirely free. The mother, her two brothers and a sister, and two daughters of the latter, had the same affection. Only in the older patients could the opacities be stained with fluorescein. The preserved sensibility, normal tension, and intact epithelium excluded Fuchs' epithelial dystrophy.

C. Zimmermann.

Pinkerton, F. J., and Cowan, T. S. **An unusual vortex vein.** Amer. Jour. Ophth., 1936, v. 19, Jan., p. 45.

Sanctis, Ettore de. **The initial symptomatology of heredoluetic parenchymatous keratitis.** Boll. d'Ocul., 1933, v. 14, Sept., pp. 1287-1296.

The clinical histories of six cases are given. With the slitlamp the following conditions were found, some common to all: corneal bedewing, corneal epithelium infiltrated, folds in Descemet's, precipitates on the posterior surface of the cornea, and deep vascularization of the cornea. The aqueous was turbid from the presence of corpuscles, the iris swollen, the pupil contracted. The initial signs were those of anterior uveitis, followed in not later than ten days by the corneal symptoms. (Bibliography.)

M. Lombardo.

Schmelzer, Hans. **The etiology and therapy of serpent corneal ulcer.** Münch. med. Woch., 1935, v. 82, Nov. 29, pp. 1905-1907.

Bacteriologic examination in 114 cases of typical serpent corneal ulcer revealed pneumococcus in 60 percent, streptococcus in 20 percent, diplobacillus in 13 percent, and staphylococcus aureus in 4 percent. Streptococcic ulcers have a better prognosis than pneumococcic. In the initial stages of serpent ulcer, cauterization should be avoided and instead the ulcer should be touched with optochin or zinc solution or tincture of iodin. In the advanced stage electrocoagulation is the method of choice. Bertha A. Klien.

Scullica, F. **Avitaminosis and the syndrome of xerophthalmia.** Ann. di Ottal., 1935, v. 63, Oct., p. 721.

While night blindness was known to the ancients and raw goat's liver recognized as its remedy it was not until 1864 that Bitot described the syndrome of xerophthalmia with exactitude.

The author's study covers the history of the vitamin relationship with hepatic secretions and reformation of the visual purple. He reports in detail eleven cases of xerophthalmia with hemeralopia, which he attributes to disturbed metabolic equilibrium. This is more marked in children, in whom the hormones have not yet arrived at their full functional power, either in the endocrine or the exocrine glands. Avitaminosis causes intolerance of fats, and a vicious circle results in which keratomalacia is but one symptom.

Park Lewis.

Tristaino, L. **Bilobular post-traumatic cyst of anterior chamber.** Boll. d'Ocul., 1935, v. 14, Nov., pp. 1554-1569.

The base of the cyst was in the lower temporal quadrant of the anterior chamber of a painful glaucomatous eye in a girl of thirteen years. The cyst occupied about one-half of the chamber. There was an adherent leucoma at the eight o'clock meridian of the cornea a few millimeters from the limbus. Pathologic examination revealed that the cyst wall was of epithelium similar to the corneal. It was apparently an epithelial cyst from invagination of the corneal epithelium. (Bibliography, 5 figures.) M. Lombardo.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Blobner, Ferdinand. **Spontaneous cyst of the iris.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 478. (Ill.)

In a woman of 25 years a spontaneous cyst of the stroma of the iris was removed by iridectomy with incision at the limbus from without inward after forming a conjunctival flap. The cyst was lined with several layers of pavement epithelium. C. Zimmermann.

Farina, Ferdinando. **Recurrent, monocular neuroangiopathy.** Rassegna Ital. d'Ottal., 1935, v. 4, July-Aug., p. 521.

A 24-year-old woman suffered in the left eye recurrent attacks of violent pain, loss of vision, edema, and ciliary tenderness. No cause other than menstrual disturbance and emotional instability could be found. A lengthy discussion of the differential diagnosis and etiology is given. Recovery followed palliative and constructive remedies, plus organotherapy. The cause is assigned as a neuroängiopathic condition of the ciliary body.

Eugene M. Blake.

Kunz, Eberhard. **Metastatic iritis in ankylopoietic spondylarthritis.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 486.

A man of 34 years suffered from relapsing iritis as metastasis from typical ankylopoietic spondylarthritis of the lumbar vertebrae. As the iritis not rarely sets in at a relatively early stage, its occurrence may aid the early diagnosis of the vertebral disease.

C. Zimmermann.

Maestro, Tullio. **Experimental oculotropism of the streptococci.** Boll. d'Ocul., 1935, v. 14, Sept., pp. 1251-1278.

Cultures of streptococcus obtained from the tonsils of sixteen persons who showed no ocular inflammatory symptoms were injected in the anterior and vitreous chambers of rabbits. The culture obtained from the vitreous of these rabbits was injected intravenously in 68 rabbits, 40 of which developed brief symptoms of iritis. From his experiments and observations the writer concludes that a non-oculophile streptococcus passing through normal eyes acquires marked oculotropism in a great percentage of cases. (Bibliography, one figure.) M. Lombardo.

Malbran, J. **The Ehrlich-Türck line.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 734. (Ill.)

The Ehrlich-Türck line was observed on the third day after a spontaneous hemorrhage into the anterior chamber, in the form of a coagulum glued to the lens capsule. Both the coagulum and the line became absorbed in the course of a week. The line was not in the form of red-cell columns, but irregular like a deposit of lymphocytes. M. Davidson.

Meller, J. **Changes in the walls of the circulus arteriosus iridis major in various forms of uveitis.** Zeit. f. Augenh., 1935, v. 87, Nov., p. 239.

Pathological changes in the walls of the circle have not previously been described in ophthalmic literature. Meller describes microscopic preparations from eyes in which such arterial-wall changes have occurred in the course of spontaneous uveitis as well as posttraumatic and sympathetic uveitis, which he also considers endogenous in origin. The changes are similar to those seen in the smallest vessels of the iris and ciliary body, and do not differ from one another in the three types mentioned. In one case the histo-

logic changes considered in textbooks as typical of each of these three types of uveitis were found in one eye.

All three coats of the vessel may be involved. The intima may proliferate, obliterate the lumen, and become a mass of epithelioid cells. The cells of the muscularis may proliferate and undergo various forms of degeneration or may transform the entire vessel into a solid mass with an onion-like structure. The elastica externa is often severely damaged and may disappear or may swell enormously. The adventitia may also be the seat of inflammation.

The author argues that, though it is generally known that syphilis is essentially a vascular disease, it is not recognized that other noxious agents injure the vessel wall equally—for example, diphtheria, pneumonia, grippe, and particularly articular rheumatism. Copious quotations from general clinical and pathologic literature elucidate the vascular changes brought about by tuberculosis and emphasize the fact that vascular changes occupy a central place in the pathogenesis of tuberculous inflammation.

F. Herbert Haessler.

Moscardi, P. **Contribution to knowledge of so-called congenital aniridia.** Boll. d'Ocul., 1935, v. 14, Oct., pp. 1421-1430.

A father, his two boys, and a girl had more or less total absence of the iris of each eye. All were also affected by rotary nystagmus, and two of the children by unilateral anterior polar cataract. The author discusses the different theories of congenital aniridia. (Bibliography.) M. Lombardo.

Müller, H. K., and Rintelen, F. **Do relations exist between hemolytic icterus and remnants of pupillary membrane?** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 609.

Referring to Schlodtmann's article (see Amer. Jour. Ophth., 1935, v. 18, March, p. 281) who believes in such a relation, the authors doubt this according to the formulas of variation statistics, while the calculations of percentage by Scholdtmann are considered too high. C. Zimmermann.

Nowkirischky, A. D. **A case of uveoparotid fever.** (Heerfordt). Klin. M. f. Augenh., 1935, v. 95, Nov., p. 620.

A man of seventeen years, seventeen months under observation, presented the typical picture of uveoparotid fever, with clinical symptoms of ocular tuberculosis, but no absolutely certain proof of a tuberculous nature.

C. Zimmermann.

Puglisi-Duranti, Giovanni. **Typical colobomata of the choroid and colobomata of the macular region.** Boll. d'Ocul., 1935, v. 14, Oct., pp. 1444-1471.

The author reports five cases of coloboma affecting different sections of the uveal tract. The etiology of three of the cases was connected with luetic or tuberculous infection. The diastolic retinal pressure was found too low in each eye in four of the patients. Coincidence of localization of the choroideremia in the macular region and arachnodactylia in one of the cases is a point in favor of the mesodermic genesis of the two malformations. (Bibliography, 14 figures.)

M. Lombardo.

Woods, A. C. **Sympathetic ophthalmia,** part one. Amer. Jour. Ophth., 1936, v. 19, Jan., pp. 9-15.

8. GLAUCOMA AND OCULAR TENSION

Barkan, O., Boyle, S. F., and Maisler, S. **On the surgery of glaucoma: mode of action of cyclodialysis.** Amer. Jour. Ophth., 1936, v. 19, Jan., pp. 21-25.

Böck, J. **Medical treatment of glaucoma.** Wiener med. Woch, 1935, no. 36, Aug. 31, p. 964.

Böck discusses first the rôle of the adrenalin preparations separately or combined with pilocarpin and eserin, and including levoglaucosan and aminoglaucosan. He mentions also such other preparations as gynergen and tenosin and concludes that the best medical treatment for glaucoma is still

pilocarpin and eserin. If these last miotics do not hold the tension within normal limits, operation is called for.
Theodore M. Shapira.

Gradle, H. S. **The effects of mydriatics upon intraocular tension.** Amer. Jour. Ophth., 1936, v. 19, Jan., pp. 37-39.

Miloro, A. **The action of "Doryl" in the treatment of glaucoma.** Ann. di Ottal., 1935, v. 63, Oct., p. 780.

Acetylcholin has been found of use in amblyopia due to the toxic effect of alcohol or quinine, and it is almost a specific in spasm of the retinal artery. Experiments both on rabbits and on man show that while its instillation in the conjunctival sac produces no reduction in the endocular tension, yet when injected subconjunctivally or into the vitreous in rabbits it causes a lowering of tension for several hours, with marked miosis. A new cholin ester (carbaminoyl choline chloride) has been introduced commercially under the name of "Doryl." Reports confirm its marked miotic and hypotensive action. Employed subconjunctivally, Velhagen found it toxic. On 22 glaucomatous patients the author compared it with the usual miotics, pilocarpin and eserin. In old cases with vascular changes the fall in tension was slight and temporary. In most of the others, however, the effect was much more marked and prompt than with ordinary miotics, the tension in some cases being reduced below normal though within the range of safety. Park Lewis.

Moretti, E. **Effects of autohemotherapy in glaucoma.** Reprint from Boll. d. Soc. med.-chir. di Catania, 1935, v. 3, no. 10, p. 636.

Details of three cases are given, the blood having been administered intramuscularly. In two cases of chronic glaucoma a lasting reduction in intraocular tension was obtained, but in a case of absolute glaucoma the effect was merely transitory.
W. H. Crisp.

Roberts, W. H. **Acute glaucoma secondary to relapsing fever followed by uveitis.** Amer. Jour. Ophth., 1936, v. 19, Jan., pp. 43-44

Trovati, Emma. **Physiochemical constant of the blood in glaucoma.** Ann. di Ottal., 1935, v. 63, Sept., p. 641.

In fifteen persons suffering from a form of chronic simple glaucoma examinations of the blood were made to determine the physiochemical constants. Morphologically the blood showed some reduction of cell count, a normal chronometric value, hemoglobin slightly augmented, slight increase in the color index with diminution of the platelets, slight retardation in coagulation time, normal sedimentation time, normal resistance to hemolysis, and viscosity slightly increased. Blood pressure was slightly increased according to age, and there was a tendency to high physiologic uric acid, low glycemia, high cholesterin content, increase in potassium, and reduction in calcium. Wassermann and Kahn tests were negative in 86.58 percent of the cases, positive in 13.32 percent. (See also Amer. Jour. Ophth., 1935, volume 18, page 1174.) Park Lewis.

Vannas, Mauno. **Cycloscopic examinations as to the behavior of the ciliary body after Heine's operation.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 629. (Ill.)

In 20 out of 37 cyclodialyses tabulated, there was detachment of the ciliary body; while in thirteen it was totally reattached. This was after ten to fourteen days or later. The longest periods after which an open dialysis was found were from eight to thirteen years. If the dialysis persists the lens is displaced somewhat obliquely, and this probably causes the astigmatism not infrequently met with after cyclodialysis. The operative results depends on patency of the supraciliary space. If the detached ciliary body becomes reattached to the sclera, the tension generally remains high.
C. Zimmermann.

Verhoeff, F. H. **A new conjunctival flap for trephining operations.** Amer. Jour. Ophth., 1936, v. 19, Jan., p. 46.

9. CRYSTALLINE LENS

Alajmo, B., and Rubino, A. **Endocrine cataract.** Rassegna Ital. d'Ottal., 1935, v. 4, July-Aug., p. 445.

The authors describe the various forms of cataract which occur with diseases almost entirely endocrine in origin—tetany, myotonic dystrophy, Mongolian idiocy, diabetes, certain thyroid affections, and some skin lesions. Biomicroscopic study of the affected lenses is important in that when there is lack of evidence of definite endocrine disturbance the ophthalmologist may assist by pointing out that these lens changes support such a diagnosis. In three cases minutely studied, lens changes hitherto undescribed are reported. The anterior layers of the cortex had the appearance of a greasy relief map. The writers believe that calcium metabolism, among other factors, plays a leading part in endocrine cataract. (4 figures.) Eugene M. Blake.

Baldino, Salvatore. **A perfected corneal suture.** Rassegna Ital. d'Ottal., 1935, v. 4, July-Aug., p. 538.

Baldino's new method of placing a corneoscleral suture in cataract extraction is as follows: A very fine needle is introduced into the corneal lamellae 1 mm. below the limbus, and is carried almost completely through the limbal tissue, leaving only the eye of the needle in the suture tunnel. The section is now begun with a regular cataract knife and is continued until the knife almost touches the needle. The cataract knife is withdrawn and the section is completed with a small sickle-shaped knife. The loop of the suture is drawn out of the wound with a small hook and the cataract is extracted. The advantages claimed are, first, that the section is completed before the globe is opened, and second, that perfect approximation of the wound is assured. (4 figures.)

Eugene M. Blake.

Bietti, Giambattista. **Further researches on the action on the lens of diet deprived of vitamin C and cystin.** Boll. d'Ocul., 1935, v. 14, July, pp. 938-944.

Ten guinea pigs were subjected to a scorbutigenous diet, the lens changes including accentuation of anterior sutures in some and white dots on the anterior capsule of others. Some guinea pigs were then subjected to a diet poor in cystin and without vitamin C. The lens findings were more marked. The writer admits that these experiments do not prove whether avitaminosis is a primary or secondary factor in the genesis of the cataract. (Bibliography, 4 color drawings.) M. Lombardo.

Grolman, G. **Biomicroscopy of cataracts in two cases of myotonia dystrophica.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 707.

Brother and sister, 34 and 31 years of age respectively, as well as the father and three other members of his family, had cataracts. Vogt's colored opacities were observed only in one case, but the opacities without color were strikingly bright. The fetal nucleus was not always involved. The advanced cases were indistinguishable from ordinary cataract.

M. Davidson.

Manes, A. J. **The extraction of choroidal cataract.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 671.

It is in choroidal cataract that extraction with capsule forceps has established its absolute superiority. Hypotension is a contraindication. Iris atrophy indicates choroidal atrophy and offers a poor prognosis. There should be no evidence of an active inflammatory process. Low grasping of the capsule is possible even in the presence of posterior synechiae, by preliminary rupture of the lower synechiae with a spatula. The zonule in these cases is quite fragile and the capsule is easily grasped. No iridectomy is advisable. In cataracts following detachment of the retina synechiae do not occur, but the vitreous is fluid and broad iridectomy and extraction with the loop is the best procedure. At least lower field vision may be secured, the detachment having generally settled to the lower half of the fundus.

M. Davidson.

Manes, A. J. **Postoperative deformation and decentration of the pupil in intracapsular extraction of cataract.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Aug., p. 579; also La Semana Med., 1935, v. 42, Oct. 24, p. 1223.

Postoperative deformation and decentration of the pupil, upward or sideways, appears about a week after operation and continues to progress for weeks. It is probably due to vitreous hernia (almost always present). The presence of pigment particles indicates ciliary body inflammation or perhaps trauma. The condition is not dangerous. It has never been observed in postoperative choroidal detachment. To prevent it a strictly corneal incision, a Hess iridectomy, reduction of iris prolapse by massage but not with spatula, avoidance of decompressive retrobulbar injections in the old, and the use of Lindner's stenopaic spectacles are recommended.

M. Davidson.

Mueller, H. K. **Concerning the mechanism of formation of vitamin C in the lens.** Klin. Woch., 1935, v. 14, Oct. 19, pp. 1498-1499.

The results of the author's experiments in vitro with ox lenses support the view, first formulated by Fischer, that formation of vitamin C in the lens can be expressed by the following formula: Sugar plus oxidized glutathion results in ascorbic acid plus reduced glutathion. Bertha A. Klien.

Orzalesi, Francesco. **Histologic observations on repair of a sclerocorneal incision for extraction of cataract, at the eighth day.** Boll. d'Ocul., 1935, v. 14, Sept., pp. 1221-1233.

The patient had died of cardiorenal sclerosis. The collagenous tissue of the scar originates from the preëxistent reticular tissue by metaplasia. The presence of cystic spaces was noted. If maintained in the final scar this might explain the filtrating character of sclerolimbal scars. (Bibliography, 4 figures.) M. Lombardo.

Rubino, A. **Cataract in a subject affected by diabetes mellitus, dwarfism, and hypophyseal cachexia.** Boll. d'Ocul., 1935, v. 14, Sept., pp. 1297-1306.

In a boy of sixteen years, subcapsular cataract gradually reduced the sight of each eye to light perception. The boy was found to have diabetes mellitus and it is assumed that when this started body development was stopped and precocious senility appeared. Was the ocular affection due to diabetes or a result of pluriglandular endocrine disturbance? (Bibliography.)

M. Lombardo.

Salit, P. W. **Phospholipid content of cataractous human lenses.** Brit. Jour. Ophth., 1935, v. 19, Dec., p. 663.

This is a careful study of 100 cataractous human lenses examined with the slitlamp microscope and classified as incipient, intumescent, or mature, before being removed by the intracapsular method. They were weighed immediately after removal and the lipids were extracted successively with chloroform, ether-alcohol, and acetone. The phospholipids were estimated as lecithin by a modification of the colorimetric method of Whitehorn. Included are: age of patient, stage and approximate duration of cataract, weight of lens, milligrams of phospholipid per lens, and percentage of phospholipid.

The results indicate definite decrease in phospholipids as the cataractous lenses approach maturity, although hitherto it had been assumed that the phospholipid content increased as the cataract advanced. The error was due chiefly to the following: omission of age; failure to differentiate between intracapsular and extracapsular lenses; failure to classify lenses according to maturity of cataract; confusion of phospholipids in their primary forms with their decomposition products.

D. F. Harbridge.

Smaltino, Michele. **The behavior of glutathione in guinea-pig lens in avitaminosis C.** Boll. d'Ocul., 1935, v. 14, July, pp. 934-937.

While the amount of ascorbic acid decreased or disappeared in the lenses of guinea pigs put on a diet deprived

of vitamin C, the glutathione value remained constantly high. The writer hints at the possibility that in the absence of ascorbic acid the glutathione may have a vicarious action in processes of oxygen reduction, so that the lens maintains its transparency. (Bibliography.) M. Lombardo.

10. RETINA AND VITREOUS

Adrogué, E., and Malbran, J. **Lagleyze-Hippel disease and retinitis pigmentosa.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 692.

The combined name "Lagleyze-Hippel," proposed by Argañaraz, is in recognition of the first complete description accompanied by a fundus drawing of the disease, by Lagleyze in 1884. The family tree of this case has been followed for three generations by the writers. A sister had nevus of the face. Telangiectasis in a son of the latter was manifested by numerous attacks of epistaxis and in a grandson by telangiectatic nevus of the face. Two nephews and one niece developed retinitis pigmentosa. M. Davidson.

Agnello, Francesco. **A case of septic neuroretinitis in the course of a kala-azar infection.** Boll. d'Ocul., 1935, v. 14, July, pp. 1050-1069.

A boy of seventeen years affected by leishmaniosis interna showed mydriasis and papilledema with enlarged central vein, numerous hemorrhages, and detachment of the left retina. Six months later the fundus showed an atrophic patch of retinochoroiditis starting at the disc, including the macula, and surrounded by pigment. The retina was flatly detached. In discussing the case the writer remarks on the rarity of metastatic neuroretinitis from a microbic embolus in tropical infections. Even a septic thrombosis may have a benign course when the microorganisms are of slight virulence. (Bibliography, one color figure.)
M. Lombardo.

Belgeri, F., and Dusseldorp. **Operation for retinal detachment.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 750.

The results in thirty cases are summarized. The procedure of Arruga, combining surface diathermy and micropuncture, has been followed. Galvanopuncture has been abandoned. The Lacarrère electrode was found to puncture the retina, so the Safar electrode has since been employed. In one case a serious uveitis followed a too extensive area of coagulation. When the area to be coagulated embraces more than ninety degrees of scleral circumference, the operation should be done in two stages. The authors still feel that surgical intervention as early as possible offers the best prognosis, and that no time should be lost in medical treatment and subconjunctival injections. Traumatic cases and those with a single not very large retinal hole offer the best prognosis. Disappearance of vitreous opacities soon after operation is a good omen and their increase a bad one. The results were successful in 50 percent of the series.
M. Davidson.

Bencini, Alberto. **Jensen's retinochoroiditis.** Boll. d'Ocul., 1935, v. 14, Oct., pp. 1472-1476.

In answer to criticism of his previous work, the writer states that Jensen's disease is a distinct clinical entity characterized by a peculiar scotoma in correspondence with the affected section of the fundus, the special ophthalmoscopic aspect of the lesion, the usual location of the focus near the disc, and the presence of only one focus. (One figure.) M. Lombardo.

Cavara, Vittoriana. **Observations on surgical treatment of idiopathic detachment of the retina, with special regard to the diathermic method.** Boll. d'Ocul., 1935, v. 14, Sept., pp. 1307-1355.

The writer gives his experience in surgical treatment of about 100 cases of idiopathic detachment of retina, 60 percent of which showed permanent improvement. He used thermopuncture, cauterization with caustic potash, the cryocautery, electrolysis, and diascleral and transcleral diathermic coagulation. He favors the diathermic method. (Bibliography.)
M. Lombardo.

D'Osvaldo, Ettore. **Retinal tonoscopy in cephalaglia.** Rassegna Ital. d'Ottal., 1935, v. 4, July-Aug., p. 543.

In persistent and unrelievable headache the author recommends measurement of the tension in the central retinal artery as described by Bailliart. Withdrawal of cerebrospinal fluid until the pressure in the central retinal artery becomes normal frequently cures the headache. Four cases were so treated. Eugene M. Blake.

Grandi, Gaetano. **Contribution to the study of Jensen's retinochoroiditis.** Boll. d'Ocul., 1935, v. 14, July, pp. 912-924.

A man of 22 years with positive Pirquet showed edema of the left papilla spreading along the upper nasal vein, and vitreous turbid from the presence of exudates. These lesions disappeared in a month, leaving a spot of atrophy. A new examination some two years later showed deposits on the posterior surface of the cornea, turbid vitreous, a whitish oval spot 0.25 d.d. in diameter which included the upper nasal vessels, a corresponding scotoma, and a few hemorrhages along the course of the upper nasal vein. All these findings disappeared, leaving a small spot of atrophy. General examination revealed a mitral insufficiency. (Bibliography, one figure.) M. Lombardo.

Horay, G. **Bilateral detachment of the retina in episcleritis spontaneously healed (Harada's disease?).** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 656.

The left eye of a man of 46 years became painful and swollen, especially on the temporal side, and after three weeks his right eye developed episcleritis, followed by detachment of both retinas. The detachment was most probably due to exudative choroiditis starting from the sclera.

C. Zimmermann.

Karasek, Otto. **Retrobulbar neuritis, detachment of the retina, and paresis of the sixth nerve as initial symptoms of posterior scleritis.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 645. (Ill.)

In a woman of 34 years the sclera surrounding the optic nerve seemed primarily inflamed. The inflammatory edema compressed the nerve, producing choked disc and retrobulbar neuritis. The flat detachment of the retina was probably caused by inflammatory exudation between sclera and choroid.

C. Zimmermann.

Lijo Pavia, J. **Concerning scleral transillumination for perfect localization of tears in the treatment of retinal detachment.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Aug., p. 598. (See Amer. Jour. Ophth., 1936, v. 19, Jan., p. 70.)

Lijo Pavia, J. **Macular and perimacular edema, and the priority of its retinographic recording.** Rev. Oto-Neuro-Oft., 1935, v. 10, Nov., p. 303.

Apropos of a paper by Mawas in the Bulletin de la Société d'Ophtalmologie de Paris for March, 1935, priority for retinographic recording of changes in macular reflexes indicative of slight degrees of edema, and of their disappearance in a case of Berlin's edema as the latter cleared up, is supported by reference to papers published since 1927. M. Davidson.

Lijo Pavia, J., and Dusseldorp, M. **Device for simultaneous scleral transillumination and application of diathermy in retinal detachment.** Rev. Oto-Neuro-Oft., 1935, v. 10, Oct., p. 257.

To avoid useless trauma from preliminary cauterization for localization, the authors have devised an attachment to the tip of the Lange transilluminator for simultaneous transillumination and diathermy puncture. With this device they have succeeded in accurately puncturing a spot selected, under control of ophthalmoscopy and the Weve contact glass, in a person blind in both eyes from optic atrophy. Electrodes with tips for Safar and for the bent Lange tip are in process of construction to make the posterior pole more approachable. M. Davidson.

Löwenstein, Arnold. **The question of the origin of relapsing vitreous and retinal hemorrhages of the young.**

Klin. M. f. Augenh., 1935, v. 95, Oct., p. 458.

In an earlier article (see Amer. Jour. Ophth., 1935, v. 18, Jan., p. 85) Löwenstein described two cases of paralysis in youthful individuals as a consequence of hemorrhage from tuberculous cerebral blood vessels, which Marchesani interpreted as partially a phenomenon of Buerger's thromboangiitis. Löwenstein refutes this, for there were no symptoms of thromboangiitis obliterans, whereas both cases were tuberculous. His opinion is supported by Askanagy's anatomical proof in a case of fatal apoplexy that tuberculosis of the cerebral vessels actually occurs and leads to nutritional disturbances and hemorrhages. In one of Löwenstein's cases the smallest quantity of tuberculin applied percutaneously led to renewed hemorrhages into the vitreous. His experiences speak for hematogenous tuberculous affection of the endothelium. C. Zimmermann.

Mann, Ida. **Congenital retinal fold.** Brit. Jour. Ophth., 1935, v. 19, Dec., p. 641.

The author bases her observation on six cases (eight eyes) in most of which a diagnosis of pseudoglioma had been made before the enucleated eye had been examined microscopically. The cases belong to a group of defects in the gross structure and differentiation of the inner layer of the optic cup. All are characterized by folds or ridges involving the inner layer of the optic cup, projecting into the vitreous, and having adherent to their surface remains of embryonic vitreous vessels. (14 illustrations.) D. F. Harbridge.

Orzalesi, Francesco. **Etiopathogenetic and clinical considerations on some retinal affections that manifest themselves by shining white spots in the fundus.** Boll. d'Ocul., 1935, v. 14, July, pp. 1071-1141.

A woman of 65 years showed the picture of retinitis circinata of the right eye. The disc was pale, retinal arteries narrow, veins tortuous and narrow, and spots of atrophic retinochoroiditis were present around the macular region. The patient had had high blood pressure and thrombosis of the central vein of the same eye two years before. The white spots in such affections are not a result of hemorrhages arising from changes in the cardiovascular apparatus and retinal vessels, but represent a hyalin reaction to a toxic stimulus, possibly of renal origin. (Bibliography, 6 figures.) M. Lombardo.

Reichling, W. **Concerning "angioid streaks."** Deut. med. Woch., 1935, no. 35, Aug. 30, p. 1394.

Reichling discusses three cases, and argues that the condition is due to primary degeneration of the elastic substance. This underlying disease shows itself in two different locations, the fundus and the skin (pseudoxanthoma elasticum). Theodore M. Shapira.

Soriano, J. S., and Picoli, H. R. **Hyalin excrescences on the papilla.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 685.

Two unilateral cases are reported. In one the mass protruded 1 or 2 mm. into the vitreous and was composed of bluish-white nodules about the caliber of a large vein in size. It produced a large fan-shaped sector-like field defect which communicated with the blind spot. The second case was more discrete, without scotoma. No familial character could be elicited in one case, while in the other the family was not examined. The first case supports the opinion of Lauber that the origin of the excresences is in the pigment epithelium and that they may produce compression of optic nerve fibers and optic atrophy. M. Davidson.

Vito, Pietro. **Contribution to the study of pigmentary degeneration of the retina produced by Pregl's iodine solution.** Boll. d'Ocul., 1935, v. 14, July, pp. 945-959.

From experiments on rabbits the writer concludes that sodium iodide injected intravenously shows an elective action for the eyeground, producing some changes similar to those induced by Pregl's solution. These experiments prove that a chemical substance can

produce experimentally a retinal picture similar in many ways to retinitis pigmentosa. (Bibliography, 3 figures, one in color.) M. Lombardo.

Zur Nedden. **Detachment of the retina and accident.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 666.

This is a refutation of Schieck's criticism of Zur Nedden's conception of the etiologic connection between detachment of the retina and concussion and bodily strain. C. Zimmermann.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Fazio, F. **Pathologic researches on chiasm, optic nerve, and retina of animals fed with a diet deprived of vitamin B.** Boll. d'Ocul., 1935, v. 14, Sept., pp. 1279-1286.

Thirty pigeons were submitted to a diet containing no vitamin B. After about twenty days they showed paralysis of the legs and then attacks of beriberi, death supervening. Histologic examination of the chiasm and optic nerves showed no lesion but the retina showed deficiency of lipoids in the pigment epithelium layer. (Bibliography, 4 figures.) M. Lombardo.

Focosi, Marcello. **Acute retrobulbar neuritis secondary to herpes zoster.** Boll. d'Ocul., 1935, v. 14, Aug., pp. 1061-1070.

A man of 44 years showed typical vesicles of herpes zoster on the left side of the face, with corneal infiltration, turbid aqueous, pupil irregularly dilated, and vision of hand movements at the periphery of the field. A large central absolute scotoma was found. These symptoms improved in a few days. To explain the visual symptoms the author assumes extension of the inflammatory process to the optic nerve through the trigeminal filaments which reach the optic ganglion. (Bibliography.) M. Lombardo.

Focosi, Marcello. **Contribution to the study of acute retrobulbar neuritis.** Boll. d'Ocul., 1935, v. 14, Sept., pp. 1193-1220.

Of ten patients one was a woman affected by acute retrobulbar neuritis of rheumatic origin, while four showed a right monolateral, four a left monolateral, and two bilateral central and field visual disturbances. The age of the patients varied from 24 to 55 years. Under diaphoretic treatment with high doses of sodium salicylate the patients either improved or recovered. (Extensive bibliography, 5 figures.)
M. Lombardo.

Heinsius, Ernst. **The question of malarial treatment of tabetic optic atrophy.** Zeit. f. Augenh., 1935, v. 87, Nov., p. 297.

Most of the published observations on tabetic patients treated by means of malarial infection give no data later than two and one-half years after treatment. Heinsius reports on reëxamination of thirty-four patients treated from 1925 to 1927. He finds his results as well as those reported by Fleischer so astonishing that even skeptical therapeutists should be induced to use malarial therapy despite its dangers. Active optic atrophy can be stopped completely or for a few years. This is the only therapy from which such results have been observed.
F. Herbert Haessler.

Hilpert, P. **Methods assisting the diagnosis of brain tumors.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 577.

In a very large number of cases the clinical symptoms alone are not sufficient for localization of brain tumors. Diagnostic methods include examination of spinal fluid, roentgen rays, puncture of the brain, encephalography, lumbal and suboccipital air inflation, ventriculography, and arteriography, which are discussed in detail.
C. Zimmermann.

Moulie, H. B., and Hurtault, J. **Leber's hereditary optic atrophy.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 677.

Observation of the disease in three brothers is recorded with its presumption in a fourth one, not examined. In all four it appeared between the ages of eight and fifteen years. Vision de-

teriorated rapidly in a few weeks from 20/80 to 20/200, and then remained stationary. The central scotoma was predominantly centrocecal. The fields were otherwise essentially normal except for slight concentric contraction in one case, and there were no disturbances of pupillary reflexes.

M. Davidson.

Poos, F. **A rare chronic course of tuberculous meningo-encephalitis in a child with precocious puberty, choked disc, and bitemporal hemianopsia.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 537.

A boy of twelve years had these symptoms, with diabetes insipidus, severe headache, and final amaurosis. Upon trephining no signs of brain tumor were found. The patient died, and autopsy revealed a recent cheesy tuberculosis of the mesenteric glands, and old perihepatitis and perisplenitis. In the brain there was no tumor formation, but edema of the brain substance and of the chiasm, granular ependymitis, papillary hypertrophy of the meninges, and encephalitis with giant cells, all probably tuberculous, and originating from the mesenteric glands.

C. Zimmermann.

12. VISUAL TRACTS AND CENTERS

Malbran, Jorge. **Visual field polymorphism in optic-chiasm arachnoiditis.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Aug., p. 632.

Optic-chiasm arachnoiditis is a definite syndrome established surgically, radiographically, and at autopsy. Priority for its description (in 1932) is claimed for the author and Balado. They have since reported 26 cases. There are three types of visual field defect: typical more or less complete hemianopsia, temporal or nasal, bilateral or unilateral; general field depression; and a relative central scotoma. The last type is the most common, bitemporal hemianopsias least common. Combinations occur. As in the case reported, this polymorphism leads at times to difficulty in differential diagnosis between arachnoiditis of the chiasm and perichiasmatic growths. On the basis of pallor of the right optic disc, paralysis of the left external rectus, and good central vision with bitemporal hemianopsia, a diagnosis of a meningioma of the tuberculum sellae was made. At operation and at autopsy only arachnoiditis of the chiasm was demonstrable. Carrillo's recent demonstration of changes in the infundibular recess, shown in ventriculograms in optic-chiasm arachnoiditis, should be helpful. In the case reported, ventriculography was attempted, but the lipiodol had failed to enter the ventricles.

M. Davidson.

Malbran, J., and Carrillo, R. **Altitudinal hemianopsia from occipital injury.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Aug., p. 642.

After a fall backwards in getting off a bus, there was a fracture of the left occiput, with bilateral choked disc, visual hallucinations, symmetrical upper altitudinal hemianopsia, more marked temporally and nasally than centrally and accompanied by a small central relative scotoma just below the fixation points. At operation a diffuse subpial hematoma was found over the occipital lobe. The hemianopsia persisted after operation. Lesions of the chiasm may produce lower altitudinal hemianopsia which is asymmetric and is due to compression of the upper fibers by the arch of the anterior cerebral arteries, but is it harder to imagine entire involvement of the lower fibers. Complete symmetric upper altitudinal hemianopsia of cortical origin would have to involve both hemispheres and be fatal if the result of a transverse gunshot injury. Vascular lesions may be responsible theoretically, but usually the result is a double hemianopsia. An oblique gunshot injury would give rise to a quadrant defect. All traumatic cases so far reported have shown lower altitudinal hemianopsia. The central scotoma in the present case argues for a bilateral cortical lesion, rather than for lesions in the radiations, from compression by a hematoma.

M. Davidson.

13. EYEBALL AND ORBIT

Moretti, E. **A case of chronic granuloma from necrosis of orbital fat.** Re-

print from Boll. d. Soc. med.-chir. di Catania, 1935, v. 3, no. 10, p. 643.

In a man of forty years, exophthalmos was due to an orbital neoformation. In the frontal region was a pigmented area in the middle of which were two small masses raised about 3 mm. above the skin. Histologic study showed chronic necrosis of the orbital sac, which the author explains as due to trauma in conjunction with hormonic dysfunction. W. H. Crisp.

Moretti, E. **Disinfection of the artificial eye.** Reprint from Riv. Sanitaria Siciliana, 1934, v. 22.

The author recommends disinfection of the artificial eye with denatured alcohol, and describes bacteriologic experiments showing the efficacy of this method. W. H. Crisp.

Moretti, E. **Ocular prothesis throughout the ages.** Reprint from La Med. Internazionale, 1935, v. 13, April-May.

A sixteen-page article reviews the history of this subject, with eleven illustrations. The concluding paragraph states that the Fascist government has succeeded in restoring the ancient Italian industry in the making of artificial eyes. W. H. Crisp.

Pierguidi, Corrado. **The glutathione content in some fluids and tissues of the eye.** Boll. d'Ocul., 1935, v. 14, July, pp. 996-1011.

The author undertook researches to determine the presence and the amount of glutathione in cornea, aqueous, lens, and vitreous of the ox eye. The average value in the cornea was found to be 79 mmg. per one thousand c.c., in the aqueous 79.7 mmg., in the lens 360 mmg., and in the vitreous 105.8 mmg. Physiologic deductions are made regarding the internal respiration of cornea and lens. (Bibliography.)

M. Lombardo.

Würdemann, H. V. **Bone formation in the orbit.** The Eye, Ear, Nose and Throat Monthly, 1935, v. 14, Nov., p. 336. (Ill.)

In January, 1921, in a woman of 25 years, the blind buphthalmic right eye with large intercalary staphyloma (due to injury at six years of age) was enucleated and fat from the abdomen implanted in the socket. In February, 1923, she came back with a depressed socket, and cold paraffin was implanted in the stump. In January, 1935, she returned stating that the paraffin had commenced to come out of the stump, and the remainder, with a thin shell of bone 6 mm. high and 12 mm. across, was removed. This corresponded with the spherical curvature of the paraffin ball. The author is satisfied that the paraffin caused proliferation of connective tissue and implantation of osteoblasts. C. Zimmermann.

14. EYELIDS AND LACRIMAL APPARATUS

Arruga, H. **Cure of lacrimation after extirpation of the tear sac.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 613. (Ill.)

Arruga's operation reëstablishes an exit through the nose, provided that the lacrimal canaliculi are intact. The results of eleven operations on ten patients were excellent.

C. Zimmermann.

Averbach, M., and Ivanova. **Twelve hundred operations of plastic dacryocystorhinostomy.** Ann. d'Ocul., 1935, v. 172, Nov., pp. 913-936.

This is a detailed discussion of the indications, technique, complications and results of 1,200 dacryocystorhinostomy operations performed at the Helmholtz hospital in Moscow. The operative procedure did not differ essentially from that of Dupuy-Dutemps. The operation was successful in relieving symptoms in nearly 96 percent of the cases. It is indicated in all cases of acute and chronic dacryocystitis and in fistulas of the lacrimal sac. There appear to be no essential contraindications. The plastic operation gives as good a result in keratitis and conjunctivitis secondary to sac infection as does removal of the sac.

John C. Long.

Cori, Renzo de'. **Severe persistent edema of the lids in a trachomatous**

subject. Boll. d'Ocul., 1935, v. 14, Oct., pp. 1395-1412.

In a man of 41 years a granular form of trachoma and pannus had been complicated for years by blepharospasm and intense edema of all the lids. The neurotic patient was found affected by diabetes, eczema on a finger, and intestinal atony. Under local treatment and improvement of general conditions the conjunctiva and cornea improved in both eyes, with disappearance of the blepharospasm and edema. (Bibliography, 7 figures.) M. Lombardo.

Gernet, R. **Further experiences with implantation of tarsus in trichiasis.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 523.

After intermarginal incision and removal of the bed of the lashes, a piece of tarsus from 2 to 3 mm. wide was implanted into the defect and secured with four sutures. The results were very satisfactory. C. Zimmermann.

Panico, Emanuele. **Anomalies of the lacrimal puncta.** Boll. d'Ocul., 1935, v. 14, Oct., pp. 1413-1420.

The author saw four cases of double lacrimal punctum, all in the lower lid, and communicating with the sac by a distinct duct which passed in every case between the normal canaliculus and the margin of the lid. The anomalous punctum was situated from 0.4 to 1.5 mm. nasally from the normal. In another case the punctum was represented by a fissure parallel to the lid margin, 3 mm. long. The biomicroscopic aspect of the anomaly is described and its pathogenesis discussed. (Bibliography, 5 figures.)

M. Lombardo.

15. TUMORS

Andrade, Lopes de. **Bilateral epithelioma of the sclerocorneal junction.** Ann. d'Ocul., 1935, v. 172, Nov., pp. 897-907.

Bilateral tumors of the limbus were encountered in a farmer of twenty years. In the four years since onset these tumors had gradually encroached upon the cornea from the temporal side until much of the pupillary area had become involved. They consisted of elevated rose-colored masses with no sign of ulceration. The growths were widely excised and the surrounding area was cauterized with the electrocautery. The microscopic appearance was that of epithelioma. (Drawings, photomicrographs.) John C. Long.

Bellavia, Alfonso. **Perithelioma of the palpebral conjunctiva.** Rassegna Ital. d'Ottal., 1935, v. 4, July-Aug., p. 482.

Bellavia's patient was a seventy-year-old woman who had previously lost the vision of each eye from iridocyclitis. For over twenty years there had been a bleeding mass in the conjunctival sac of the right eye. This mass, when removed, was of the size of a large hazelnut. Histologically there were large vascular spaces, delimited by a reticulo-endothelial layer. Proliferated endothelial-cell masses were present as cords, compressed by new-formed blood vessels. The tumor possessed a distinct capsule. The author considers perithelioma a definite pathologic entity. (2 figures.) Eugene M. Blake.

Busacca, Annibale. **Pigmented tumors of the lacrimal caruncle.** Rassegna Ital. d'Ottal., 1935, v. 4, July-Aug., p. 502.

The author describes two pigmented new growths of the caruncle, the first a lymphogranuloma in a man of 21 years, the second a melanosarcoma in a woman of 45 years. Tuberculous toxemia was considered to be the cause in the first case, and an endocrine disturbance associated with the climacteric in the other. Microscopically, there was only a slight alteration of the original tissue in the lymphogranuloma. In the sarcoma there was destruction and disappearance of the original tissue through substitution of the pigmented tumor elements. Epithelioid and giant cells were observed. Surgical removal resulted in permanent cure in the first case but metastasis could not be excluded in the second, because of the presence of tumor cells in the vessel walls. (5 figures.) Eugene M. Blake.

Chojnacki, P. **Contribution to the knowledge of plasmocytic granulomas (plasmomas of the conjunctiva).** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 470. (Ill.)

Two cases in women of 20 and 23 years are reported with detailed clinical histories and histologic findings.

C. Zimmermann.

Choun, C. K. **Statistics of prognosis of uvea sarcoma.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 444.

All patients should be observed till death and the causes of death determined. A period of five years without relapse or metastasis does not prove cure. Out of 61 patients at the eye clinic of the University of Berlin fourteen had died, but only in nine were exact data as to the cause of death available. Eight died of metastasis in stomach and liver, three of them five years after enucleation. The metastases usually appeared as spindle-cell sarcoma. Sarcoma of the choroid inclined more to metastasis than that of iris or ciliary body. The sixth decade of life seemed to be most favorable to metastasis. Early enucleation is the operation of choice. Exenteration of the orbit is called for only after eruption of the sarcoma. In most cases it will be too late for preventing metastasis. Of the still living patients 34 were reexamined. Only eight were suspected of metastasis. The melanin test of the urine was not once positive.

C. Zimmermann.

Dehogues, J. L. **Exophthalmos from orbital tumor.** Ann. d'Ocul., 1935, v. 172, Nov., pp. 907-912.

Marked exophthalmos from an orbital tumor was seen in a Negro boy of sixteen years. The tumor had been present for three or four years and had gradually increased in size. Diplopia had been noted early but had disappeared as the eye became blind. The globe was surrounded and fixed by a hard tumor mass. The fundus appeared normal except for optic atrophy and vascular changes. The tumor was removed and was found to be a pear-shaped body about 5 cm. long. It surrounded the optic nerve. The growth was an oligodendrocytoma (classification of Rio-Hortega) of intradural origin.

John C. Long.

Kreibig, Wilhelm. **Intraocular metastasis of sarcoma.** Zeit. f. Augenh., 1835, v. 87, Nov., p. 265.

From the study of smallest sarcomata in the eye we know that primary sarcoma arises in the suprachoroidea. The literature yielded six uncertain cases of metastatic sarcoma, and ten which to the author seemed certain. In not one had choroidal sarcoma metastasized to the choroid. In a personally observed case, the author was able to find a small metastatic tumor nodule in the central choroidal strata distant from the primary growth. In the eye of a fifty-year-old woman with a large choroidal sarcoma and many small nodules, the author interpreted the picture as superficial implantation of tumor cells which had been released from the primary mass. Double sarcoma of the choroid has been observed a number of times and the author describes in detail an eye observed by him. In an eye enucleated because of a large choroidal sarcoma, a second small nodule was found which had all the characteristics of the so-called "smallest sarcoma" which has been described in the literature. Though definite proof is lacking, it seems to the author most likely that both tumors were primary.

F. Herbert Haessler.

Natale, Amadeo. **Hemogemangioma of upper lid with extension to lower lid, temple, and orbit.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Aug., p. 587.

The term "hemogemangioma is proposed to replace the current "fibroangioma" in view of the vascular and congenital origin. In the older literature it was described as elephantiasis. The case described and illustrated with photomicrographs was that of a pulsating large tumor of the upper lid which caused erosion of the outer orbital wall and which was extirpated. Mast cells were observed in the sections, particularly near newly formed capillaries.

M. Davidson.

Orth, H. **Metastases in choroid and optic nerve in mammary carcinoma.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 625. (Ill.)

The patient died of bronchopneumonia and pulmonary metastases. Microscopic examination showed a carcinoma in the lamina cribrosa and the central part of the optic nerve, no encroachment on the retina, but extensive carcinomatous infiltration of the choroid.

C. Zimmermann.

Soriano, F. J., and Picoli, H. **Two cases of Recklinghausen's disease.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Aug., p. 620.

Two cases of plexiform neurofibromatosis of the upper lid are reported, both on the right side, and accompanied by pigmented skin lesions with papillomatous nevus in one case and a sessile pigmented hairy tumor in the other. The term neurogliomatosis is preferred. M. Davidson.

16. INJURIES

Azevedo, Amir. **Corneal puncture by one of the hymenoptera (wasp).** Rev. de Ophth. de São Paulo, 1935, v. 4, Oct., pp. 193-194.

The patient, a man of 29 years, was stung while working in a cafe. The sting was not left in the cornea. The wound healed in about a week.

W. H. Crisp.

Borsellino, Gaspare. **A late observation of evulsion of the optic nerve.** Boll. d'Ocul., 1935, v. 14, July, pp. 984-995.

A boy of five years, who two years before had been wounded by a cow horn, showed a scar parallel to the lower orbital margin. At the normal site of the optic disc was a round whitish area without blood vessels and having near its periphery a narrow ring of pigment. With one exception no retinal blood vessels were visible. The author assumes that at the time of the accident the eyeball was rotated violently upward with detachment of the optic nerve from the scleral ring. (Bibliography, 4 figures.) M. Lombardo.

Fontana, Giuseppe. **The action of phenol upon the eye.** Rassegna Ital. d'Ottal., 1935, v. 4, July-Aug., p. 487.

Bartolotta's statement that the presence of one quarter percent of phenol in Ruota's antitrachomatous virus led to injury of the cornea prompted Fontana to study the effect of this drug upon animal and human eyes. Concentrations of from 0.25 to 6 percent were instilled into rabbit eyes several times a day for a period of two weeks. Up to 2 percent concentration no irritation was observed. From 2.5 to 3 percent produced conjunctival hyperemia of a few hours' duration, but no changes seen under the slitlamp. Four-percent solutions induced chemosis and slight corneal turbidity. Six-percent solutions caused corneal epithelial desquamation which healed in two to three days. In ten trachomatous patients, phenol up to 3 percent concentration produced no destructive effects. Therefore the weak content of phenol in a vaccine cannot injure the ocular structures.

Eugene M. Blake.

Morse, A. W. **Magnet extraction of intraocular foreign bodies.** Amer. Jour Ophth., 1936, v. 19, Jan., pp. 40-42.

Neuman, Jakob. **Early operative treatment of caustic injury to the eye, etc.** Klin. M. f. Augenh., 1935, v. 95, Oct., p. 491. (Ill.)

From 50 operations on 42 cases, and experiments on rabbits and dogs, Neuman reaches the following conclusions: In severe caustic injury of the eye immediate excision of necrotic conjunctiva and transplantation of labial mucous membrane is the only rational procedure. Slightly burned eyes are to be treated conservatively. Cases are tabulated, and some detailed clinical histories are given with technique, results, and experimental and pathologic researches. C. Zimmermann.

Orzalesi, Francesco. **Finding of vitreous bands in anterior chamber a result of trauma from application of forceps at delivery.** Boll. d'Ocul., 1935, v. 14, July, pp. 901-911.

A few days after birth a grayish-white appearance of the cornea had

been noticed, which lasted a few days. At the age of ten years slitlamp examination disclosed slight opacities in the deep layers of the corneal stroma and some transparent bands which traversed the anterior chamber obliquely and were adherent by their extremities to the posterior surface of the cornea. The writer thinks they originated from the separation of strips of Descemet's membrane during the use of forceps in delivery. (Bibliography, one figure.)
M. Lombardo.

Schwartz, V. J. **Nonsurgical reattachment of iris in a case of traumatic iridodialysis.** Jour. Amer. Med. Assoc., 1935, v. 105, Sept. 28, p. 1032.

In a boy aged twelve years, a toy-torpedo explosion caused traumatic iridodialysis above, and hemorrhage into the anterior chamber and vitreous. Cataract due to rupture of the lens developed. The use of atropin was promptly followed by full mydriasis, the iris being pushed immediately well toward the periphery of the anterior chamber. Six weeks after the injury it was evident that the iris had become completely attached above. Later discission was completely successful. (One photograph.) George H. Stine.

Vittadini, Angelo. **Two cases of paralysis of an eye muscle by indirect trauma.** Rassegna Ital. d'Ottal, 1935, v. 4, July-Aug., p. 492.

In the first case described there was slight injury to the upper lid margin by a cow's horn, with laceration of the bulbar conjunctiva. Ptosis of the same lid appeared and gradually recovered. In the second case a trident injured the skin of the upper lid and produced subconjunctival hemorrhage on the nasal side of the eye; and one week later there was paralysis of the external rectus. In each case there was evidently a paralysis by contrecoup, the force of the blow being transmitted through the eyeball. Eugene M. Blake.

17. SYSTEMIC DISEASES AND PARASITES

Avgushevich, P. L. **Ocular involvement in malaria.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 1, p. 66.

Of seventy cases of corneal complication 36 had herpes, 33 dendritic keratitis, and 1 parenchymatous keratitis. Seven cases of fibrinous iritis, 6 of vitreous opacity, 2 of retinal hemorrhage, 2 of optic neuritis, 3 of optic atrophy, and 2 of posterior polar cataract illustrate the bizarre form and the severity of malarial ocular complications.
Ray K. Daily.

Chronis, P. **Hydatid cyst of the orbit.** Klin. M. f. Augenh., 1935, v. 95, Nov., p. 668.

A woman of fifty years received a blow over the right eye. After three months she noticed a small tumor which grew rapidly, with impaired vision, a feeling of pressure, and headache. An elastic nonfluctuating tumor covered by the upper lip protruded from the palpebral fissure, displacing the eyeball. Through a horizontal incision oozed serous fluid which contained a small scolex of tenia echinococcus. The milk white capsule was removed complete. Microscopically it showed numerous muscular fibers, probably of the inferior rectus.
C. Zimmermann.

Cregor, J. S., and Burchell, E. B. **Filaria subconjunctivalis.** Case report. Arch. of Ophth., 1935, v. 14, Sept., pp. 435-440.

A French sailor aged 48 years stated that he had seen the parasite under the conjunctiva in the same eye six and again three years before. Each time it disappeared in a few hours. This time the adult filaria loa was grasped with a forceps and removed through a small incision. A description of the parasite and its life cycle is included. (Photographs.) J. Hewitt Judd.

Ginandes. **Eruptive fever with stomatitis and ophthalmia.** Amer. Jour. Dis. of Children. 1935, v. 49, May, p. 1148.

The author reports one case and cites several others of a condition occurring in children, about which he is not sure whether it is a new clinical entity or atypical erythema exudativum multiforme (Hebra). There is a generalized eruption of a chronic nature involving

the whole body except the scalp, with sudden onset of fever and severe conjunctivitis. Of seven cases described in this paper, only two escaped total loss of vision, and even in these two the vision was markedly reduced. External canthotomy is suggested for the severe edema and the panophthalmitis which usually follow. M. E. Marcove.

Kapuscinski, W. **Contribution to the question of focal ocular infections.** Ann. d'Ocul., 1935, v. 172, Oct. pp. 817-826.

Fifty-one cases of anterior uveitis are reviewed. Dental foci were to blame in most of them. Of 27 cases of retrobulbar neuritis the teeth were at fault in at least twelve and probably more. The author describes a mild form as latent cyclitis. Such cases were always associated with dental disease and were cured by extraction of the infected teeth. The author does not accept the German view of the widespread importance of tuberculosis in ocular inflammations. John C. Long.

Kazas, I. I., Kovarskaja, S. S., Krol, A. G., Berman, A. H., and Vershavskaja, P. P. **Ocular involvement in botulism.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 1, p. 61.

One hundred cases of botulism were carefully studied for ocular symptoms. The most frequent was diminished corneal sensitivity, which in favorable cases disappeared rapidly, although in some it persisted for three to five weeks. Defective convergence, found in 52 cases, disappeared in eight to ten weeks. There were 48 cases of ptosis, which as a rule lasted several weeks. Nystagmus and nystagmoid movements were seen in 42 cases and were the first symptoms to clear up. Paresis of accommodation, lasting three to four months, was seen in five patients. Eighteen cases had restricted ocular movements and three had lagophthalmos. Cloudy vision, due probably to a sympathetic disturbance, occurred in 31 patients, thirteen patients had dilatation of the retinal veins lasting two or three months, nine patients had disturbance of color vision, and photophobia was recorded in nineteen.

Ray K. Daily.

Kirwan, E. O'G. **A tick on the upper eyelid.** Brit. Jour. Ophth., 1935, v. 19, Dec., p. 659.

In a man aged 22 years, a tick (Dermacentor auratus) was attached to the lower border of the upper eyelid. This tick is rarely observed in man but usually infests wild animals.

D. F. Harbridge.

Viallefont, H., and Diacono, E. **The rôle of vitamins in ophthalmology.** Arch. d'Opht., 1935, v. 52, Oct., p. 723.

Vitamins A and C are the most important from an ophthalmic viewpoint. Avitaminosis-A reveals itself as conjunctival xerosis or keratomalacia and hemeralopia. Hemeralopia may not be accompanied by any objective sign, but may reveal itself as a constriction of the visual field for green and especially for red. But biomicroscopy will often reveal early changes in the corneal epithelium. Under the name of paravitaminosis the authors group certain manifestations which are cured or relieved by vitamin therapy. Torpid trophic keratitis, phlyctenular keratoconjunctivitis, and other slowly healing corneal lesions have yielded to local vitamin-A therapy.

Vitamin C has been less well studied. Lack of it produces scurvy not associated with ocular disturbance. But the authors believe that recurrent hemorrhages in the vitreous may be ascribed to lack of vitamin C in the diet. The rôle of vitamin C in the production of cataract has not yet been satisfactorily explained. (Bibliography.)

Derrick Vail.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Alvaro, M. E. **Classification of the causes of blindness.** Rev. de Ophth. de São Paulo, 1935, v. 4, Oct., pp. 173-176.

The author offers, in Portuguese, and with very brief comments, a classification under 21 headings.

Bednarski, Adam. **Vitello.** Klinika Oczna, 1935, v. 13, pt. 3, p. 489.

This year is the 400th anniversary of the first edition of Vitello's book on optics, which the author discusses.

Ray K. Daily.

Berens, C., Kerby, E. C., and McKay, E. C. **The causes of blindness in children: their relation to preventive ophthalmology.** Jour. Amer. Med. Assoc., 1935, v. 105, Dec. 14, p. 1949.

This paper is a study of 2,702 children in schools for the blind in the school year 1933-1934. Extended and important conclusions, too detailed to permit satisfactory abstraction, are deduced. (4 tables, discussion.)

George H. Stine.

Campos, P. A. **Rationalization of a special clinic.** Rev. de Ophth. de São Paulo, 1935, v. 4, Oct., pp. 189-192.

A series of classification and record cards is proposed for the eye department and the ear, nose, and throat department.

Koszutski, Bronislaw. **Trachoma in Kalisz.** Klinika Oczna, 1935, v. 13, pt. 3, p. 576.

A statistical report of the last five years' work against trachoma in this village. Ray K. Daily.

Melanowski, W. H. **Optimum illumination for optimum visual efficiency.** Klinika Oczna, 1935, v. 13, pt. 3, p. 500.

The equipment used in the study was the apparatus of Kruss-Voege for colorimetric study of light, Weston's photometer with a photoelectric cell, and the spectrophotometer of Koenig-Martens. The criteria for the study were visual acuity, color sense, visual fields, and the size of the pupils. The plotted results show that the optimum illumination is between 20 and 300 foot-candles. The author finds that most artificial sources of light contain too much red and too little blue. He recommends that this be corrected with a blue filter. For near work the author recommends a 60-watt daylight globe, which at a distance of 33 cm. gives a 45-foot-candle illumination on a white surface.

Ray K. Daily.

Miyashita, S. **Legal and social measures against trachoma in Japan.** Rev. Internat. du Trachome, 1935, v. 12, pp. 148-164. (See Amer. Jour. Ophth., 1935, v. 18, Dec., p. 901.)

Natanson, D. M. **The condition of the eye in porters.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 2, p. 164.

Conjunctivitis among porters is a vocational affection. Myopia may be caused by the orbital congestion incident to lifting heavy burdens. The frequency of anisocoria among porters is caused by involvement of the sympathetic from the daily strain.

Ray K. Daily.

Rutherford, W. J. **A rationalized miracle in medieval England.** Brit. Jour. Ophth., 1935, v. 19, Nov., p. 609.

This contribution relates to a passage given in its original form from Bodleian MS. 850, between the years 1381 and 1406. Modern interpretation seems to indicate that a bird's nest situated in a tree near a well, in Bisham, England, was used as an offertory, for the benefit derived from the well, rather than for the healing of eye diseases.

D. F. Harbridge.

Sená, J. A. **Observations on trachoma in Santiago del Estero.** Arch. de Oft. de Buenos Aires, 1935, v. 10, Sept.-Oct., p. 711.

Inspection revealed a large percentage of trachoma constituting a serious public health problem. Stress is laid on the importance of combating it through the children. Extension of the campaign conducted in Santiago del Estero, where the results are encouraging, to the other infected northern provinces of Argentine is recommended.

M. Davidson.

Van Cleve, E. M. **Provisions for the schooling of the blind and partially blind.** Arch. of Ophth., 1935, v. 14, Sept., pp. 473-480.

The history and the work of the New York Institute for the Education of the Blind are reviewed. J. Hewitt Judd.

Volokonenko, A. I. **Research material for study of the epidemiology of trachoma.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 1, p. 84.

The author maintains that the basis of study should be the first case of trachoma encountered in a family which

includes a few infected cases, and in a locality where there is little trachoma. The study should investigate the source of the original infection, and the factors favorable to spread of the disease in the family. This involves consideration of social structure, habit, personal hygiene, age, sex, and constitutional peculiarities of the patient, with special emphasis on lymphatic constitution and other diatheses. Ray K. Daily.

Zabugin, K. A. **A trachoma study of the entire population of the Chuvash republic.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 1, p. 91.

The author attributes the prevalence of trachoma to the ignorance and poverty of the exploited classes. The plan to combat trachoma consisted of a preliminary educational campaign by youth leaders and students, followed by an examination of the entire population, and by the opening of trachoma clinics in charge of a trachoma nurse. The trachoma nurses were given six months of special training. An oculist visits the dispensary once a month, reexamines the infected cases, and leaves instructions to the nurse. No small part of the undertaking was the struggle with superstitions of an ignorant population, and with baseless rumors. The percentage of population infected with trachoma was reduced from 59.7 percent to 25 percent between 1932 and 1934. Ray K. Daily.

Zachert, M. **Social and administrative measures against trachoma.** Rev. Internat. du Trachome, 1935, v. 12, July, pp. 118-145. (See Amer. Jour. Ophth., 1935, v. 18, Dec., p. 902.)

19. ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Anelli, Dante, **Morphologic notes on the structure of the corneal plate in some reptiles and fishes.** Boll. d'Ocul., 1935, v. 14, July, pp. 925-933.

In reptiles the corneal plate is formed of four layers, in fishes of only two, originating from the skin and the sclera. In reptiles a space is noted between the plate and cornea, while in fishes this space is represented by loose fibrillary tissue. (Bibliography, 3 figures.) M. Lombardo.

Rossi, F., and Mocchi, V. **Observations on the nerve supply of the ciliary body and of the iris.** Ann. di Ottal., 1935, v. 63, Oct., p. 773.

The authors employed Golgi's method in studying the nerves of the ciliary body and iris in white rats. In both they describe a probably sensory network, and in the sphincter was found a second network, evidently of motor nerves. In the ciliary body were highly developed perivascular fibers and plexuses, probably having to do with secretion of the aqueous. (One plate, 2 figures, bibliography.) Park Lewis.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth

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News items should reach the Editor by the twelfth of the month.

Deaths

Dr. David Aloysius Prendergast, Cleveland, aged 54 years, died December 2, 1935.

Dr. C. Norman Howard, Warsaw, Ind., aged 60 years, died November 11, 1935, of coronary thrombosis.

Dr. William Otis McBride, Fort Wayne, Ind., aged 57 years, died November 5, 1935.

Dr. Stanley Sinclair Smith, Pittsburgh, aged 61 years, died December 2, 1935, of myocarditis.

Dr. Harry Ralph Wormley, Rockford, Ill., aged 56 years, died November 20, 1935, of heart disease.

Dr. Franklin Pierce Capion, Providence, R.I., aged 83 years, died December 16, 1935, of aortic aneurysm.

Dr. William Norwood Souter, Portsmouth, aged 74 years, died November 24, of carcinoma of the stomach.

Dr. Hugo Albert Kiefer, Los Angeles, aged 65 years, died October 26, 1935.

Dr. Thomas Herbert Bell, Winnipeg, aged 63 years, died November 28, 1935, of cerebral embolism.

Dr. James Joseph King, New York, aged 53 years, died November 29, 1935.

Miscellaneous

In the reorganization of the Department of Ophthalmology at the Long Island College Hospital, beside the usual internship of one year a new residency is to be established for one year also. This does not eliminate the possibility of a mixed service at this institution, as the intern or resident in ophthalmology, having completed his service, gets special consideration should he make application for appointment in the Department of Otolaryngology.

The open course for interns being conducted at the New York Eye and Ear Infirmary by talent from the five boroughs is proving a great success and the principle certainly should be applied elsewhere. It seems better to conduct one well-rounded and complete course than to have each institution supply such lectures as those in which their own staff members are interested.

Klinische Monatsblätter für Augenheilkunde recently published as a special 103-page supplement a complete series of the letters addressed by Albrecht Graefe to Donders. A translation of a paper by Van Herwerden, in which the content of the Graefe letters was discussed, appeared in the American Journal of Ophthalmology, 1919, volume two, page 277.

Societies

At the November 18, 1935 meeting of the Chicago Ophthalmological Society, Dr. Robert Blue, presiding, the following program was given: A critical review of the effects of Cortin in glaucoma, by Dr. John Bellows; Concerning the ciliary ending of the dilator pupillae, by Dr. Bertha Klein; Correction of cicatricial ectropion by the detached skin graft, by Dr. Philip O'Connor; Giant magnet operation, by Dr. W. A. Fisher.

The Brooklyn Ophthalmological Society program for February 20th, was as follows: Significance of fundus lesions in essential hypertension, arteriosclerosis, and kidney diseases, by Dr. Martin Cohen with discussion by Dr. John N. Evans and Dr. David Wexler.

This year the International Assembly of the Inter-State Postgraduate Medical Association of North America will be held in the Public Auditorium of St. Paul, Minnesota, October 12 to 16, 1936.

The following program was given at the Scientific Meeting of the Eye Section of the Philadelphia County Medical Society on February 6, 1936: Clinical case from Wills Hospital, by Dr. Samuel Phillips; Traumatic iridodialysis: Presentation of two cases, one with nonsurgical reattachment, by Dr. Mortimer W. Blair; Disappearance of cataractous lens following an attack of iritis: Presentation of patient, by Dr. Frank A. Murphy; Nodular dystrophy of the cornea, Salzmann type: Presentation of patient, by Dr. Alfred Cowan; Blood staining of cornea and anterior capsular stellate cataract: Presentation of patient, by Dr. George J. Dublin; Retinitis pigmentosa with special reference to sympathectomy as a means of treatment and report of three cases: Presentation of patients, by Dr. Charles W. LeFever.

The Annual Congress of the Ophthalmological Society of Egypt will take place at the Memorial Ophthalmic Laboratory, Giza, on March 27 and 28, 1936.

Personals

Dr. Clarence E. Ferree, Adjunct Professor of Physiological Optics and Director of the Sub-Department of Physiological Optics, a unit of the Wilmer Institute of Ophthalmology, resigned his post on October 31, 1935. His wife, Dr. Gertrude Rand, Associate in Physiological Optics, resigned at the same time. Dr. Ferree and Dr. Rand came to Baltimore in 1928 from Bryn Mawr College, in order to organize a laboratory of physio-

logical optics in connection with the Wilmer Institute. Dr. Ferree has been unable of late to devote to the work of the laboratory the close personal supervision which seemed desirable, and for that reason he and Dr. Rand resigned.

Dr. Harold F. Pierce, Associate Professor of Ophthalmology of Johns Hopkins University since 1927, resigned at the end of the academic year in order to become an intern at the Bellevue Hospital in New York City. Dr. Pierce came to the University in 1927 from the Department of Physiology of Columbia University, in order to become a member of the Department of Ophthalmology under Dr. Wilmer. He assisted Dr. Wilmer in the details of the early development of the Wilmer Institute, and later undertook the study of medicine in the school in order to fit himself for a career in clinical medicine.

Dr. Joseph L. McCool of San Francisco has been appointed Chairman of the Eye, Ear, Nose and Throat Section of the Pan-Pacific Surgical Association. The next meeting will be held at Honolulu during the second week of August, 1936.

A dinner was given in honor of Dr. John M. Wheeler at the Union Club on the occasion of the third anniversary of the opening of the Eye Institute. Thirty members of his staff were present.

Dr. William H. Wilmer has recently been initiated into the membership of Sigma Xi. He has also been elected an honorary member of the Ophthalmological Society of the United Kingdom.

Professor Giuseppe Ovio, Director of the Royal Ophthalmic Eye Clinic of Rome, retired October 31, 1935, having reached the compulsory retirement age of seventy years. An enthusiastic appreciation of Ovio's career was presented by Professor Maggiore in the October issue of Annali di Ottalmologia. Ovio is one of four Italian ophthalmologists who have been elevated to the position of Senator in the Italian parliament. One of the others was Cirincione, who for many years occupied the directorship of the Rome Clinic. Among other publications, Ovio has issued an important work on the comparative anatomy of the eye.

Professor Richard Deutschmann of Germany died on November 13, 1935, aged 83 years. He was a prolific writer on ophthalmology. He anticipated Gonin in the use of galvanopuncture for retinal detachment, although hardly upon an equally scientific basis.